THE ARCHITECTURAL FORUM

JANUARY

1922

Compl. Complete July 8/25

Walr,
Arch.

10-21-1922

ARCHITECTURAL DETAILS Modern wood carved mantel (Georg.) . . . . 80 House, Charles Burral Pike, Lake Forest, Ill.

Complete July 8/25

THE ARCHITECTURAL FORUM

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L'ECOLE COMMUNALE, BEAUNE, BURGUNDY
FROM THE PENCIL DRAWING BY HOWARD MOÏSE

The
ARCHITECTURAL FORUM

VOLUME XXXVI | JANUARY 1922 | NUMBER 1

Some Ideas on Bank Buildings—Artistic and Practical

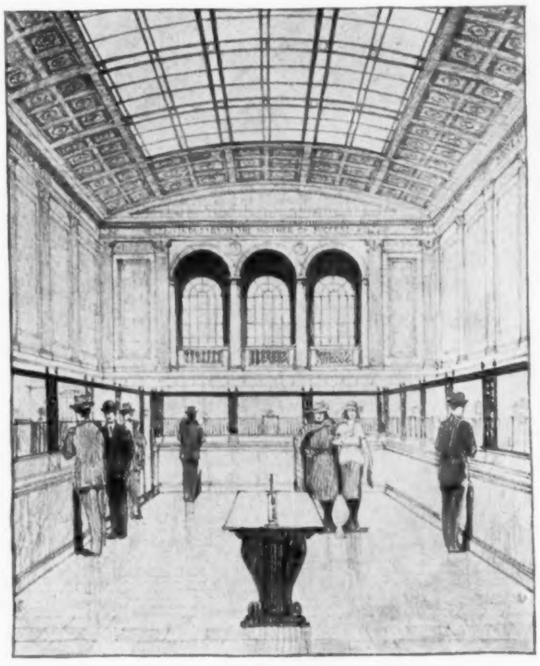
By ALFRED HOPKINS

With illustrations from buildings designed by the author

TO the architect with imagination the possibilities offered by the bank building for noble and appropriate architecture should make an instant appeal. The influence of the bank on the daily life of the community is continually increasing, and it is not too much to say that just as the church stands for the highest ideals in the spiritual life, so the bank seeks to elevate and maintain them in the business and social life of the community. The bank is therefore becoming more and more the place where good counsel may be obtained, where practical help for the sound enterprise is given, and, in the larger institution, where records and information which will assist the business man in maturing his judgment are kept, tabulated and freely distributed. Such in brief is the distinguished position of counselor and friend which the bank has come to occupy in the community. In what way, therefore, should its house be built? The accompanying text and illustrations give some suggestions.

The Bank a Public Institution

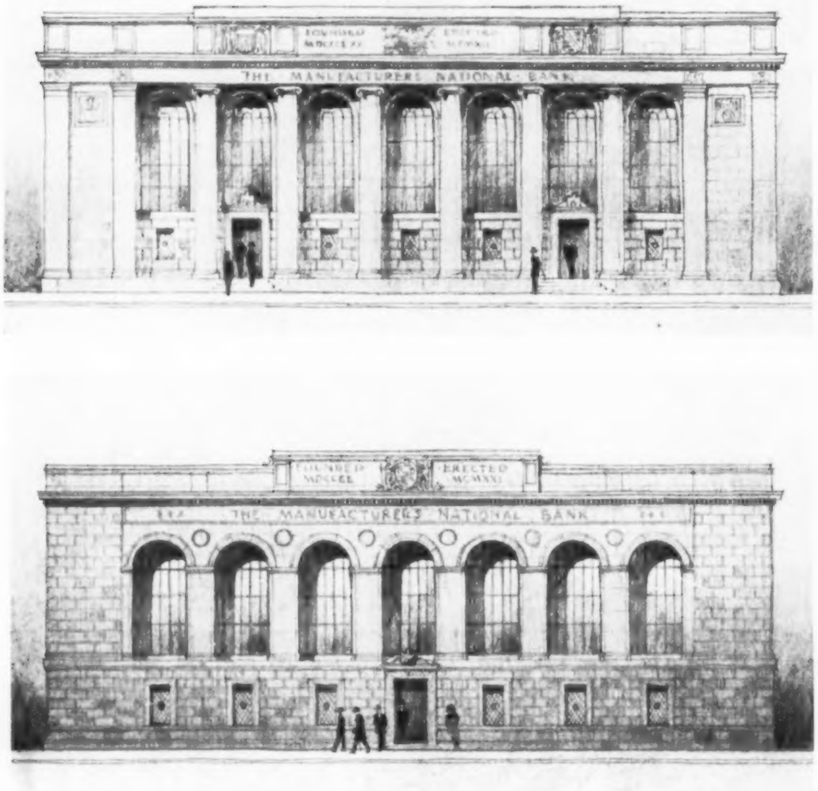
As the bank is a public institution its most appropriate architectural expression is to be found in the classical style, but that does not mean the tasteless iteration and reiteration of pediments, columns, arches and the general jumbling of classical motives with which the commercial bank builders have made us all familiar. Noble architecture is the bank's greatest asset so far as its house is concerned. Taste and refinement should be in its every feature, and it has many features which may be treated originally and appropriately.



Interior, Commercial Bank and Trust Company Building
Bridgeport, Conn.

Two Types of Buildings

When the time arrives for the bank to take thought of the increased comfort and advantages afforded by a new building there are two types of structure which come to mind,—one the individual home for the bank's exclusive use, and the other a building which shall seem to be primarily the bank's, but with sufficient additional renting space to return a revenue. This latter type at first thought seems to be preferable, but the writer's experience is that banks which build office buildings for their income return sooner or later regret it. In such a building the quarters of the bank, to which it is vitally necessary to give distinction, and particular emphasis, become only incidental. The bank, after all, is but one of many occupants; consequently it is difficult to focus public attention upon it. Then, too, the bank ties up money which ordinarily it can use to better advantage in its own business and embarks on a venture which is foreign to it. Renting office space is not banking, and a bank president to whom was expressed this view thus explained his position: "Having been associated with the National Bank of Commerce and having participated in the erection of its building, I heartily concur in all you have to say with respect to an individual bank office. It certainly gives distinction



Alternative Sketches for Exterior of a Bank in Troy, N. Y.

to an institution and relieves those in charge of a great deal of annoyance, care and responsibility. I found in my old position, that although we had a capable superintendent, the tenants' complaints finally reached me."

This is the expression of a man who had to do with the erection of a 14-story office building. Only where the bank seeks something quite apart from the ordinary relation between landlord and tenant, as when it wishes to have others with it in a reciprocal association of interest, or when the bank is limited in what it may do in reaching out for new business or if the property it owns is very valuable, or when some special condition prevails, would it seem desirable to build other than the individual bank building. In the individual building only is it possible to attain that distinction already referred to and which will be emphasized throughout this article.

Ventilation and Lighting

Where the conditions make it possible, the first thing to change in the usual bank's construction is the indiscriminate use of the overhead skylight. No building so constructed can be considered fireproof. Large skylights are always a hazard, either through the possibilities of fire or accident from adjoining properties or from leaks due to the contraction and expansion of its material exposed to the extremes of temperature from both within and without. Then the best opportunity of the interior for the display of design is in the ceiling, because the view of it is always uninterrupted and the intrusion of the skylight here detracts from the dignity of a purely architectural treatment. Ordinarily a much better method of lighting is to employ the light well, either at the side or at one end, which not only gives light, but what is equally important, ventilation. On these two factors, light and ventilation, hang all the law and the prophets of the architect's bible. A building which fails in these essentials fails irrevocably. A mechanical ventilating plant is usually as poor a substitute for the fresh air which blows in at the window as the electric bulb is for the light of heaven. Consequently a bank situated on an interior lot, with only the front open, should be provided with area lighting and ventilation whether the skylight is used or not, for the chief difficulty in depending entirely upon the skylight is that while it may be made to give light, it is impossible to use it to advantage as a means of obtaining fresh air.

Different Banking Plans Described

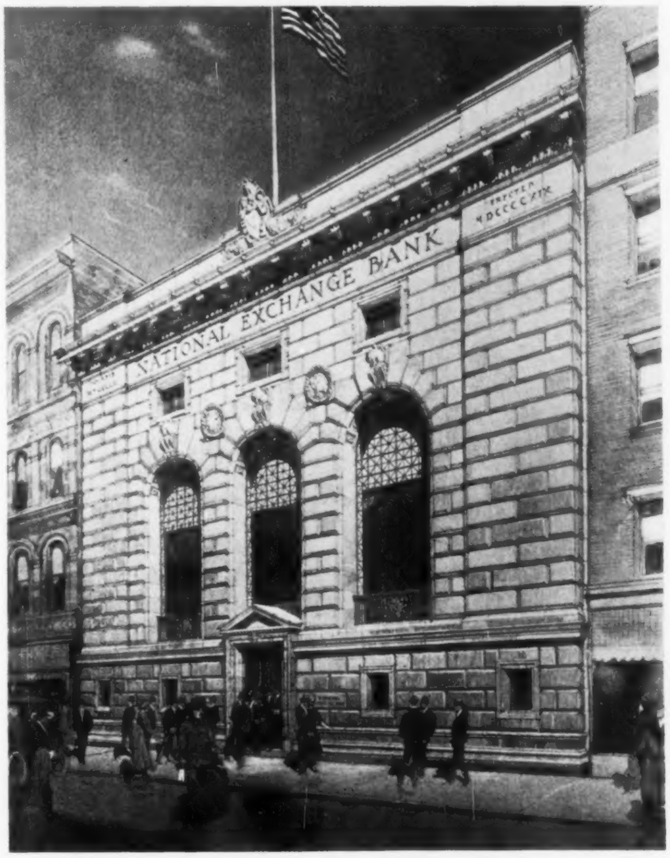
With regard to the interior arrangement of the banking plan there are three general possibilities: the so-called "U" plan, the "island" plan, and the "half-island" plan, which leaves the banking screen open on three sides with the fourth against the wall. All of these schemes are useful, but their adoption depends largely upon the needs of individual cases.

The island plan is always convenient for the bank, and especially for the savings bank. The intercommunication between the various departments which it affords is immediate, but on the other hand such an arrangement is always inconvenient to the public. The author knew of one bank which had used the island plan for 40 years, and in its new building it chose the U plan solely on account of the greater convenience it gave to its customers. On the other hand, when this instance was cited to a bank president, who was in the throes of deciding upon the type of plan for his new building, he promptly dismissed the island plan with an equivalent to that classic phrase, "the public be damned." What he wanted to consider solely was the convenience of the bank. In special in-

stances, perhaps not all like that just cited, the island plan may be desirable, but for the usual commercial bank it is better to use either of the other types. These give the public more direct contact with the service which the bank has to offer and by care in the design of their equipment can be made to serve the bank as well as the island plan, and the public better.

The U plan, on the other hand, is always a good arrangement for the public, as it puts all departments within easy view and reach. A central space less than 14 feet in width is not advisable in a busy bank, though ample in the smaller institution where crowded conditions seldom prevail. This brings up the width of the cages. The teller's space can be relatively small if conveniently arranged, a depth of four feet clear floor space, and a width of four feet, six inches between center to center of the tellers' windows are the minimum though satisfactory dimensions for the city bank. Country banks usually desire more room than this because accustomed to it, and there is no reason why they should recede from that position. There are still some advantages left for the country which the city lost long ago, and one of them is space.

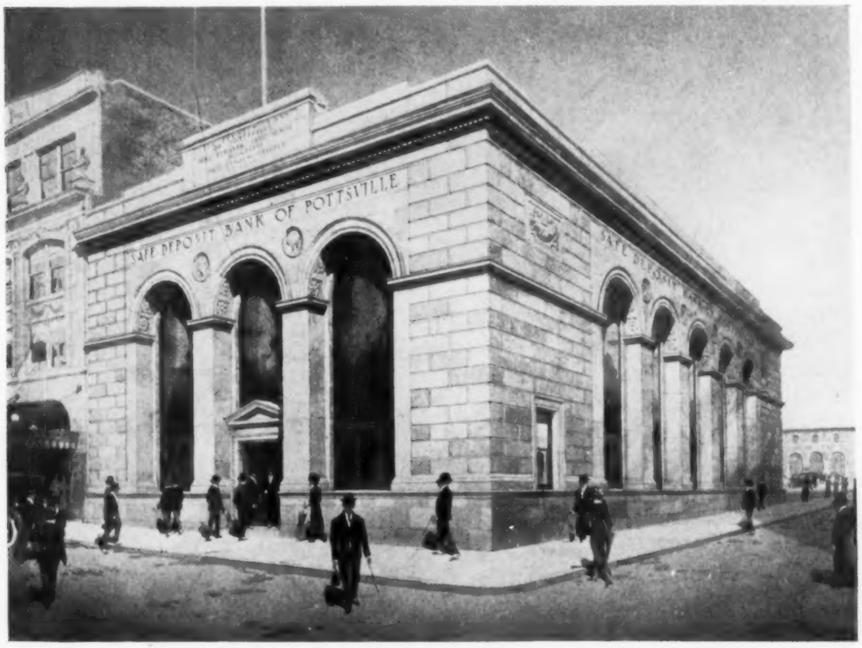
What has been called the "half-island" plan or, if one wishes to persist in the geographical idiom, the "promontory plan," is a compromise between the two schemes and sometimes, if the lot will permit, it is possible to combine the advantages of both without the difficulties of either. The half-island plan leaves the screen open on three sides, or it may run down one side of the building and across the end, and this arrangement generally obscures the view of the interior less than the other. The plan which gives the effect of the most spacious interior is always the best architecturally and is usually the best from the practical side.



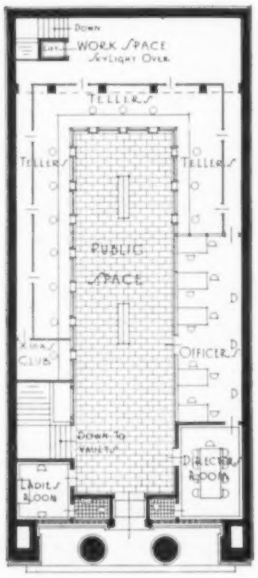
Design for Commercial Bank on Wide Interior Lot in Important City

The shape of the plot, or its situation or exposure, is what most frequently determines the plan. It is much better to use one of the types of bank plans which can be worked out naturally and logically with all elements considered—those of convenience for the bank and public, not forgetting consideration for a proper architectural expression—than to try to develop a plan the principles of which fit everything but the lot on which it is to be built.

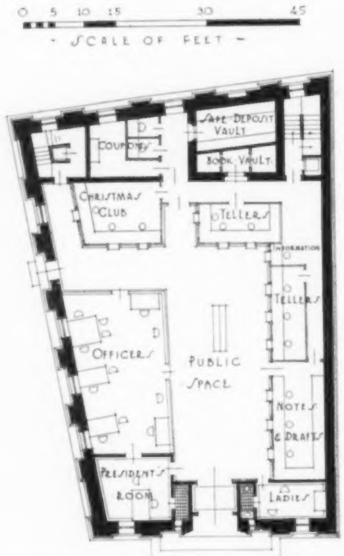
There is one feature, however, which should be considered in every plan of whatever variety, and that is the possibility of future



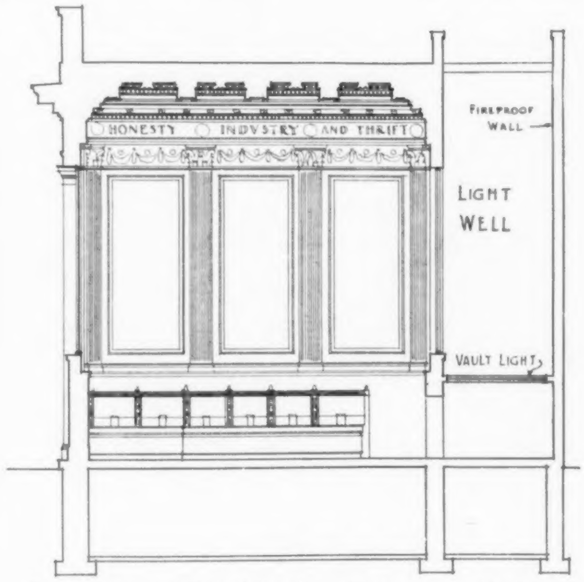
Sketch for a Small Building in Pottsville, Pa.
Showing the value of large, low windows in bank design



U-shaped Plan on Interior Lot: Overhead Light



Half Island Plan Giving Convenience and Good Interior View



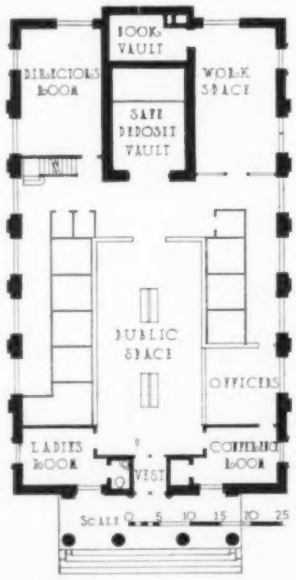
Section Showing Daylighting from Well at Rear of Building Working Space Below

expansion. It is safe to say that no bank was ever built too large, and that it has been the experience of all that the new building is outgrown in half the time expected by the most optimistic member of the building committee. This is a matter now recognized by everyone so that the architect's tentative plan should show a way of increasing the number of wickets and of adding materially to the working space, and the preliminary survey should always take this necessary feature into careful account.

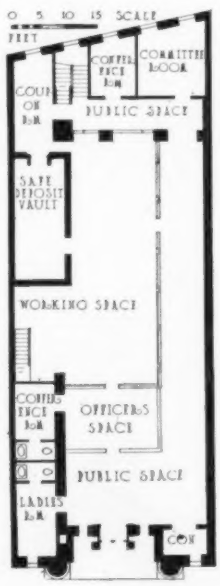
Locations of the Officers and of the Vault

In the discussion of the type of plan there are always two things of importance which come up for consideration: they are the locations assigned to the officers of the bank and to the vault. Since it is slowly coming to be known that the bank is a human institution—which one might take the liberty of suggesting as the chief reason for its increasing prosperity—it is very necessary that its officers be where they are immediately accessible to the public. When they have been for years at the rear of the banking room, as frequently happens in the old buildings, sometimes there is a certain hesitancy about arranging for an officers' space too far forward. Experience proves that, finally, everyone prefers a forward position and indeed for increasing business it is an absolute necessity. The president should always have his own private office and it is frequently desirable that other rooms, in the form of committee rooms or meeting rooms for the public, be provided. An alcove in the public space is always useful where the out of town depositor may make out his slips, sometimes long ones, at a table where he can be seated, while the women's room has now become a necessary accommodation in every banking institution, though it must be confessed this feature is sometimes overemphasized.

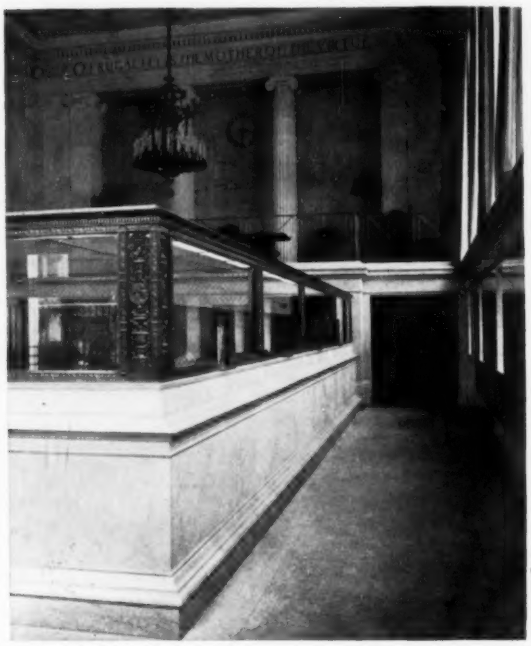
The location of the vault is preferably on the main floor and in plain view, but when every foot of space must be utilized there the vault may be put in the basement to advantage. In the busy city bank this is the best place for it. There is no doubt that a fine vault is not only an absolute necessity, but it is a prime factor in increasing public confidence and securing new business. The tendency is clearly to develop it to afford greater security. Heavier linings are being used with doors of proportionate thickness. The processes of manufacturing the different types of steel are continually being improved and steel more and more immune to tool cutting is being perfected. A non-burnable metal has

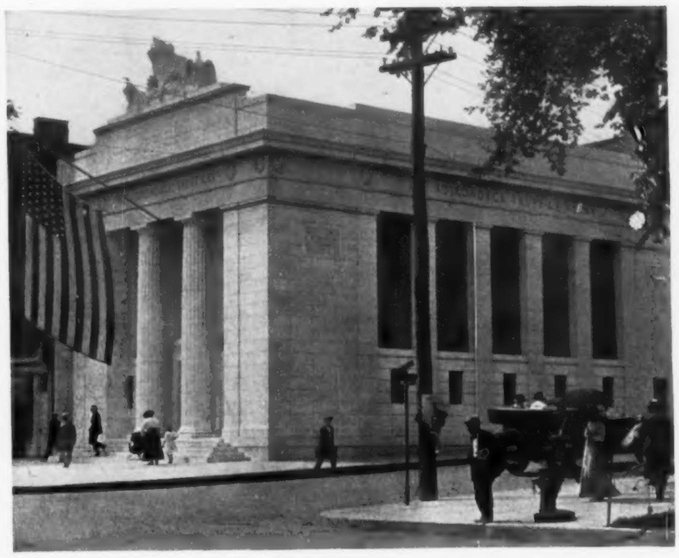


Typical U-shaped Plan with Light on Both Sides



Half Island Plan on Narrow Interior Lot





Exterior and Interior Views of the Adirondack Trust Company Building
Saratoga Springs, New York

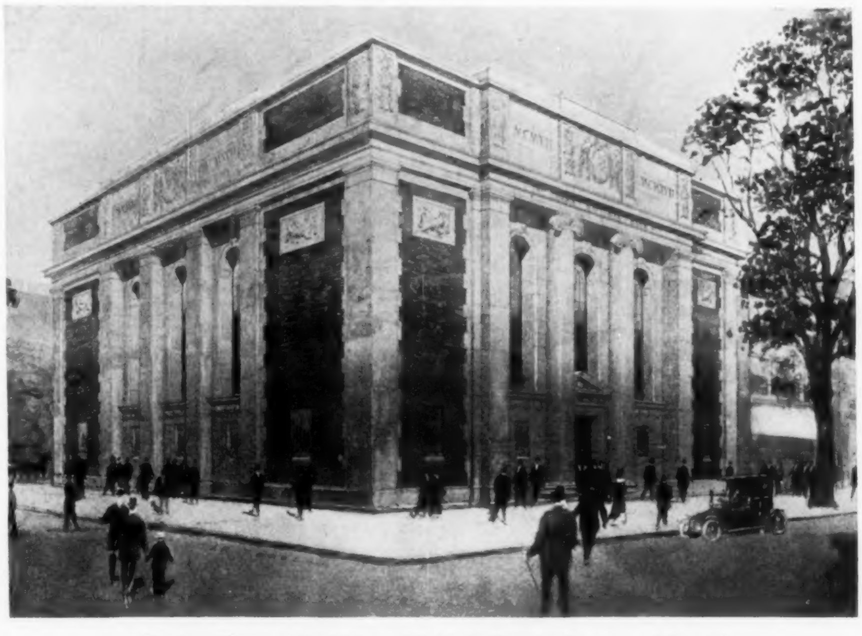
been developed and the contents of the modern vaults can now be absolutely protected against three distinct methods of attack—open hearth against explosives, chrome steel against drilling, and non-burnable metal against the cutter burner.

The vault door is a splendid piece of mechanical engineering. Whether it is square or ciicular is a matter of personal preference. The circular door takes twice as much metal as the square door and requires a larger area in which to swing properly, but mechanically it is a more perfect fit, being ground into its jamb with emery and oil, thus forming its own contact bed. In its advertising value it is always effective and in its security always efficient. The steelwork of the vault is best reinforced by concrete walls in preference to walls of brick, and this preference is more pronounced when the concrete walls are in turn reinforced with bars of tool-proof steel. This makes assurance doubly sure, and the comparatively small additional cost is always a good investment.

The vault may be made large enough so that it contains both the rented safety deposit boxes and the bank's money chests. When this is done the bank's portion is separated from the public spaces by a grille. When, however, separate vaults are provided, one for the public and another for the bank, they are sometimes identical in design in order that they may carry out a uniformity of appearance. There is never any advantage in lining a book vault with metal. All that is ever needed here is protection against fire and this can be had with masonry walls and an adequate fireproof door, and the same thing applies to the vaults for the storage of trunks and silver.

Details of the Banking Floor

The intimate details of the banking floor will be dealt with briefly here, but important to and well worthy the consideration of the busy city bank is the recently developed custom of paying and receiving at the same window. This is more



Design Showing the Value of Brick in Exterior Design, a Material
Too Often Neglected in Bank Building

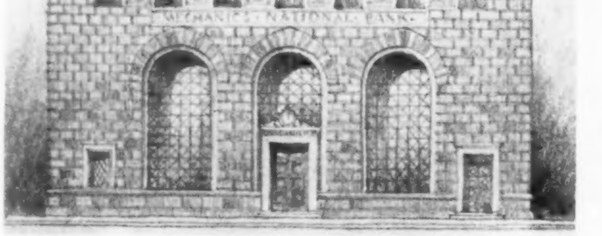
Bank Design for 30-ft. Interior Lot. Architectural Effect through Vertical Emphasis

Savings Bank at Elyria, Ohio, Showing Dignified Treatment on 35-ft. Interior Lot

general on the Pacific coast than elsewhere and seems to have been inaugurated by the First National Bank of Los Angeles, but the custom is now in use by several large city banks.

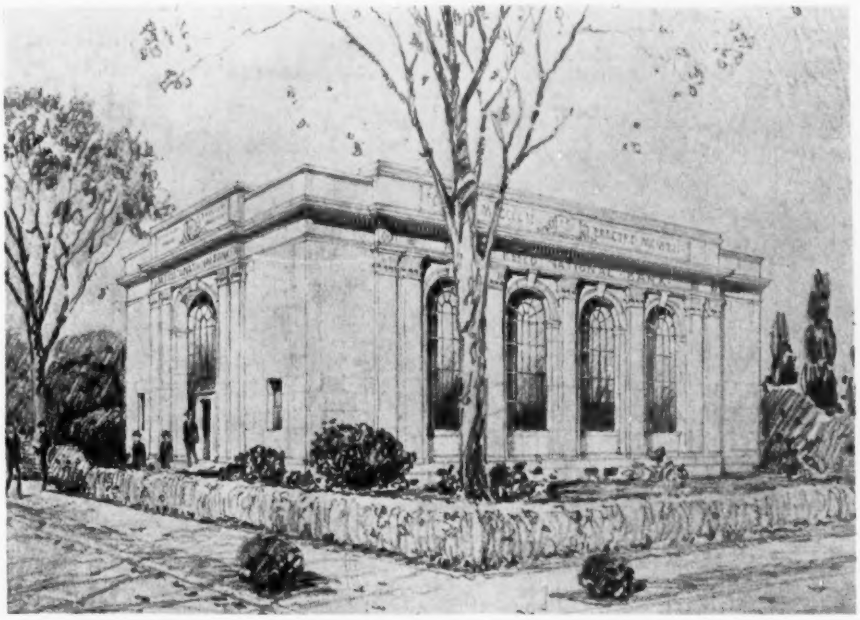
The improved method is quite simple. In one cage, six feet by nine feet free floor area, there are two windows and two tellers, each of whom receives and pays from the same window. If the area of the working space is sufficient the bookkeepers should adjoin them, this combination making a unit for the drawing account business. Each teller keeps his account independently of the other and each is provided with his own money and key to his side of the money safe in the cage. One teller may borrow money from the other, but he must give a receipt for it.

The advantages of paying and receiving at the same window, from the bank's standpoint, are that the tellers have fewer accounts to handle and are consequently much more familiar with them, and the important fact that they work on both sides of the account, paying and receiving, increases that familiarity very materially. The advantage from the public's point of view is a very great increase in accommodation over the usual system; when during some parts of the day the crowd is depositing, with few drawing money, the receiving tellers would be very busy while the paying tellers would be idle. Paying and receiving at the one window make the bank service much more flexible and also promptly equalize any disparity in numbers between those who wish to deposit and those who wish to draw money.



Sketch for a Bank Building in Pennsylvania

It is always important to place the working portion of the bank where it will receive all possible benefits from natural light, where it is necessary to make a choice between natural and artificial light. The

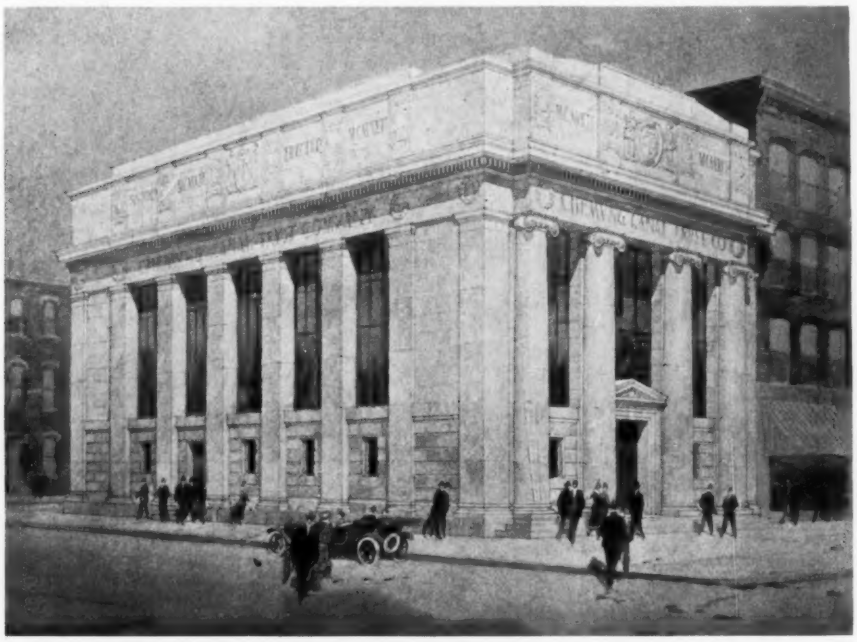


Mt. Kisco National Bank Building, Mt. Kisco, N. Y.

public spaces may very properly be left to artificial lighting. With respect to the bank's equipment, in the larger institution it is always advisable to carry this out on a unit system which greatly facilitates extension in the future. The telautograph, the pneumatic tube and the autophone are all such satisfactory methods of communication that there is little disadvantage in having the clerical force removed from personal contact with the tellers. In the large institution this separation is quite usual, but in the smaller bank, where floor space is always available, the entire work of the bank may well go on behind the screen. This well tried plan should be continued.

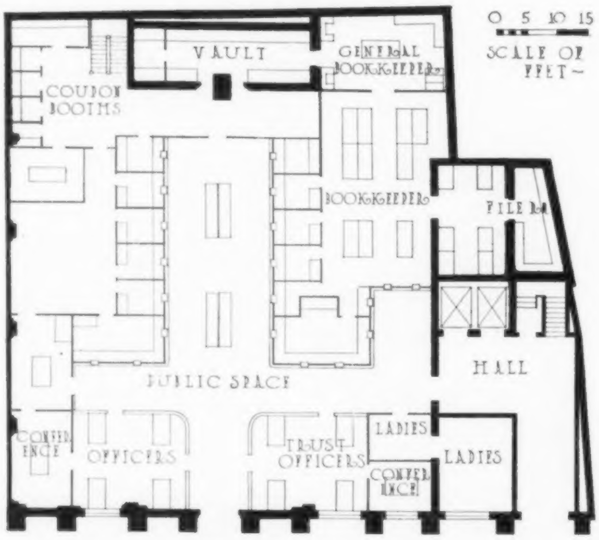
Opportunities for Artistic Treatment

The general practical problems which are considered in the modern bank building have been dealt with briefly, but these in the really successful structure are part and parcel of the architectural scheme. Every detail of the bank is just as responsive to artistic treatment as it is to the latest practical device. The screen offers endless opportunities for originality in its ornamentation. Designs of old coins, of which there are countless varieties, are always appropriate; in the screen of the Adirondack Trust Company, Saratoga Springs, N. Y., pine needles and pine cones are interwoven in the ornament, and in an Ohio bank the buckeye was conventionalized into a flowing and graceful design, together with the outlines of ships denoting commerce, the beaver symbolizing industry, and the winged hourglass and the dollar sign typifying time and interest. Opportunities are endless for appropriate ornamentation, but this should not be overdone, and following out an important architectural principle already expressed, that of giving to the interior the greatest possible effect of space, the screen is best kept light in appearance and as low as practicable. To fill up the bank's interior with the screen is a pernicious architectural error which is frequently made. It is the effect of space which should be emphasized and not those things which may so easily take away from it.



Design for Building on Corner Lot Showing Value of an Attic to Give Solidity to Bank Design

With the interior of spacious effect it is quite possible for the architect to provide things which are worth looking at. It is not at all necessary for the directors to convene behind closed doors, as is usually supposed to be the case. Frequently the directors' meetings take place after banking hours and an open balcony, removed from but

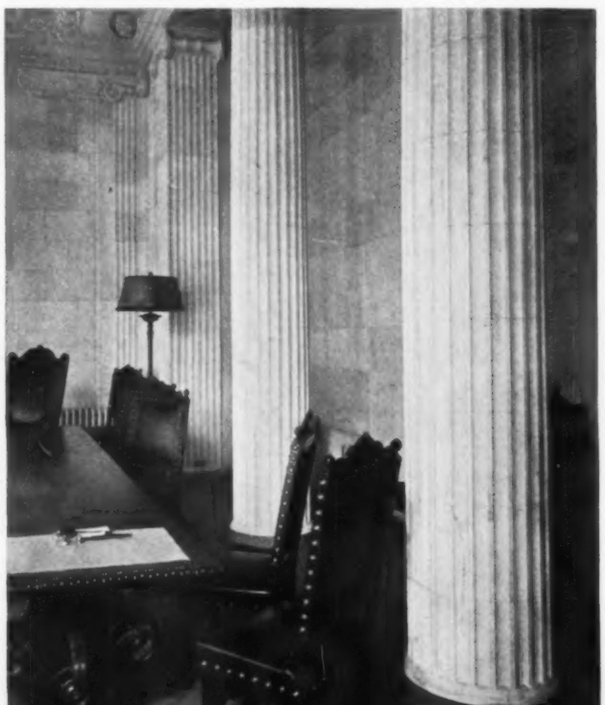


A U-shaped Plan for Building of Large Floor Area

looking down into the main banking room, is an entirely practical place and one which is architecturally attractive. The open directors' balcony in the Adirondack Trust Company has proved entirely satisfactory. A balcony can, and should, be treated architecturally and should certainly be used for a dignified purpose. A very recent and important banking office in New York has two balconies contained within a series of arches which surround the great banking room. These have been used for the clerical force, and the din of the typewriters and the adding machines, deflected to the floor by the arched ceiling, is literally deafening. The bank should not sound like a miniature manufacturing plant, and to prevent this is important.

Instead of the usual cut and dried ornament in the frieze it seems proper and appropriate that fitting inscriptions be placed here. George Washington said: "Economy makes happy homes and sound nations. Instil it deep;" and Abraham Lincoln said: "Teach economy. This is one of the first and highest virtues. It begins with saving money." Both these names and characters have a strong popular appeal. Among other expressions of good advice which the author has used for this purpose are: "Saving is a greater art than earning;" "A penny saved is a pound earned;" "Diligence is the parent of Fortune;" "Frugality is the mother of the virtues;" "The first years of a man should prepare for the last." This latter maxim is perhaps the most direct and clear cut of all, and how few of us realize the importance of it! It ought to be engraved in the back of every man's mind, and it is good business for the bank to help put it there.

So it is seen that all functions of the bank may find their proper and beautiful expression in architecture, whether they be related to those things which are needed for a practical purpose or to that position of prestige and influence which the bank should occupy in its community, and it was just this which the writer meant when he wrote: "To the architect with imagination the possibilities offered by the bank building for noble and appropriate architecture should make an instant appeal."


A Simple and Dignified Treatment for a Board of Directors' Room

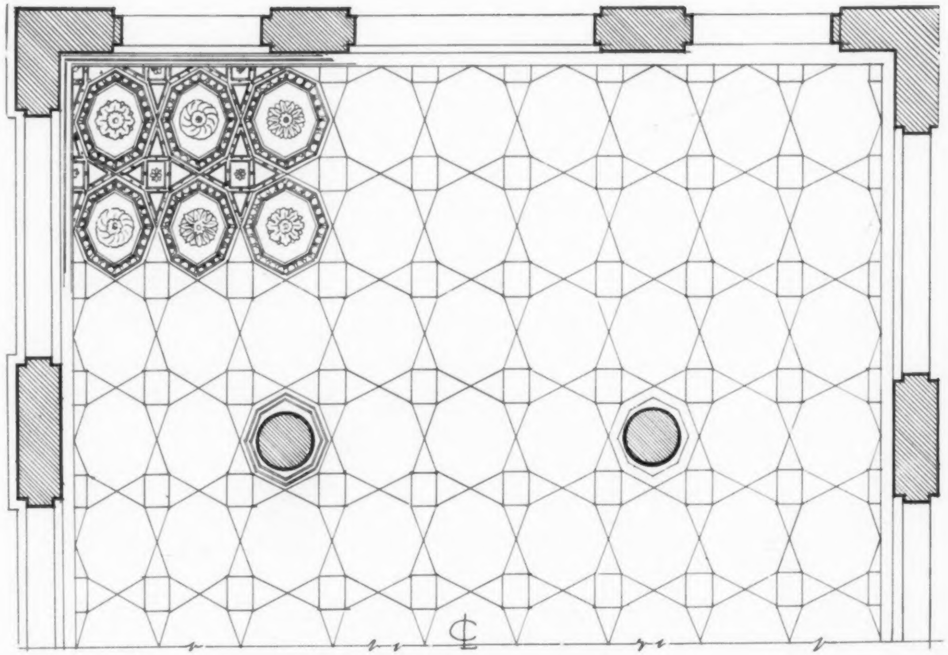

Corner in the Ladies' Room in Adirondack Trust Company Building

VIEW LOOKING TOWARD ENTRANCE

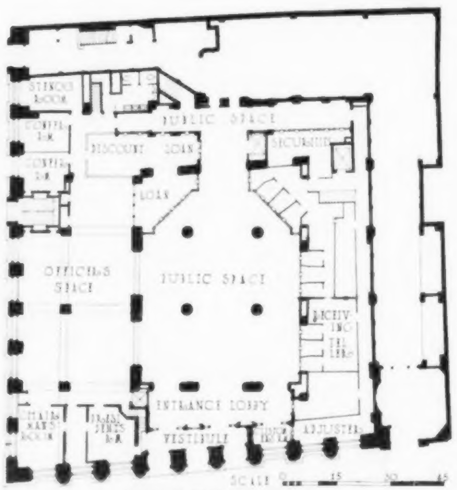
BANKING ROOM, NEW YORK TRUST COMPANY, NEW YORK

WALKER & GILLETTE, ARCHITECTS

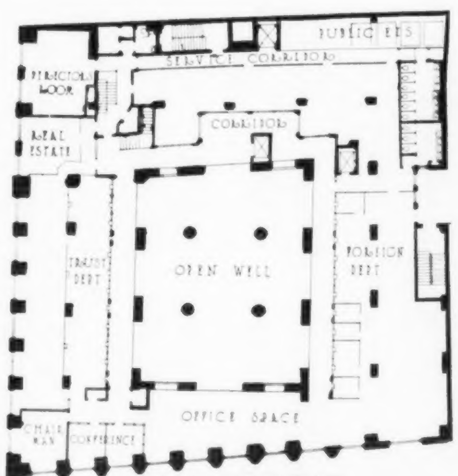
JANUARY, 1922 THE ARCHITECTURAL FORUM PLATE 2



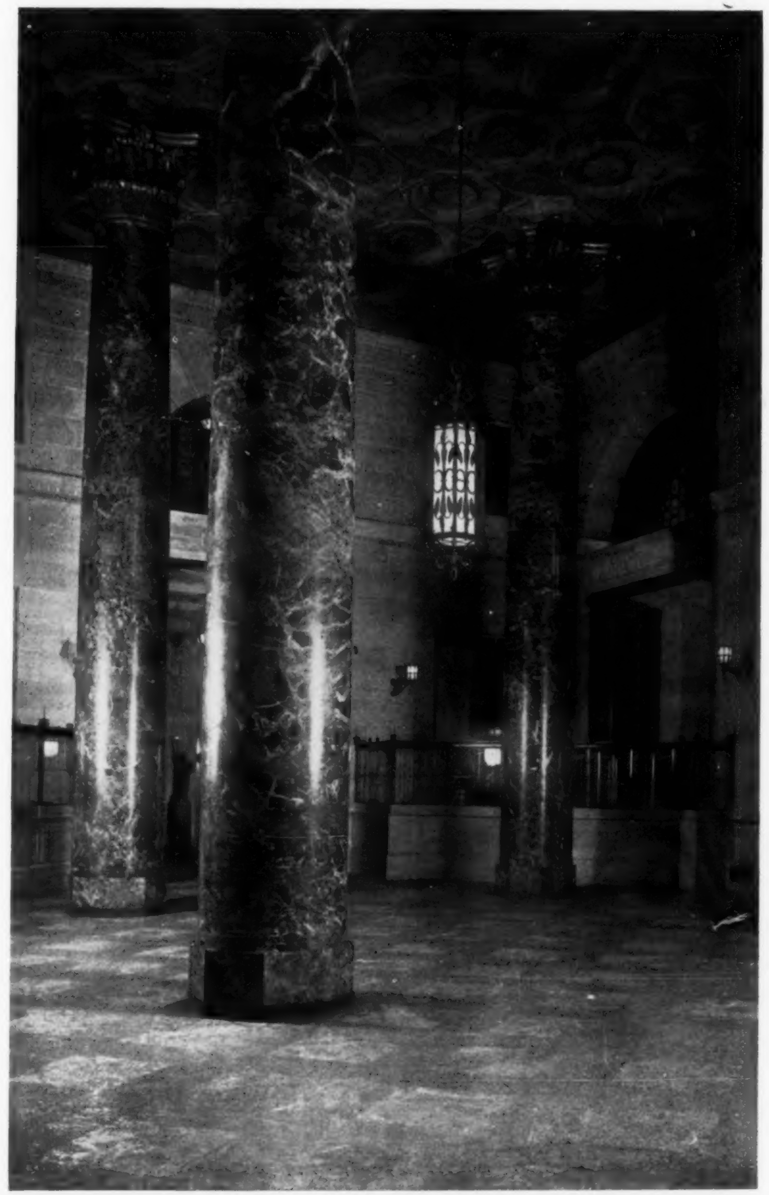
HALF PLAN OF MAIN CEILING



FIRST FLOOR PLAN



SECOND FLOOR PLAN

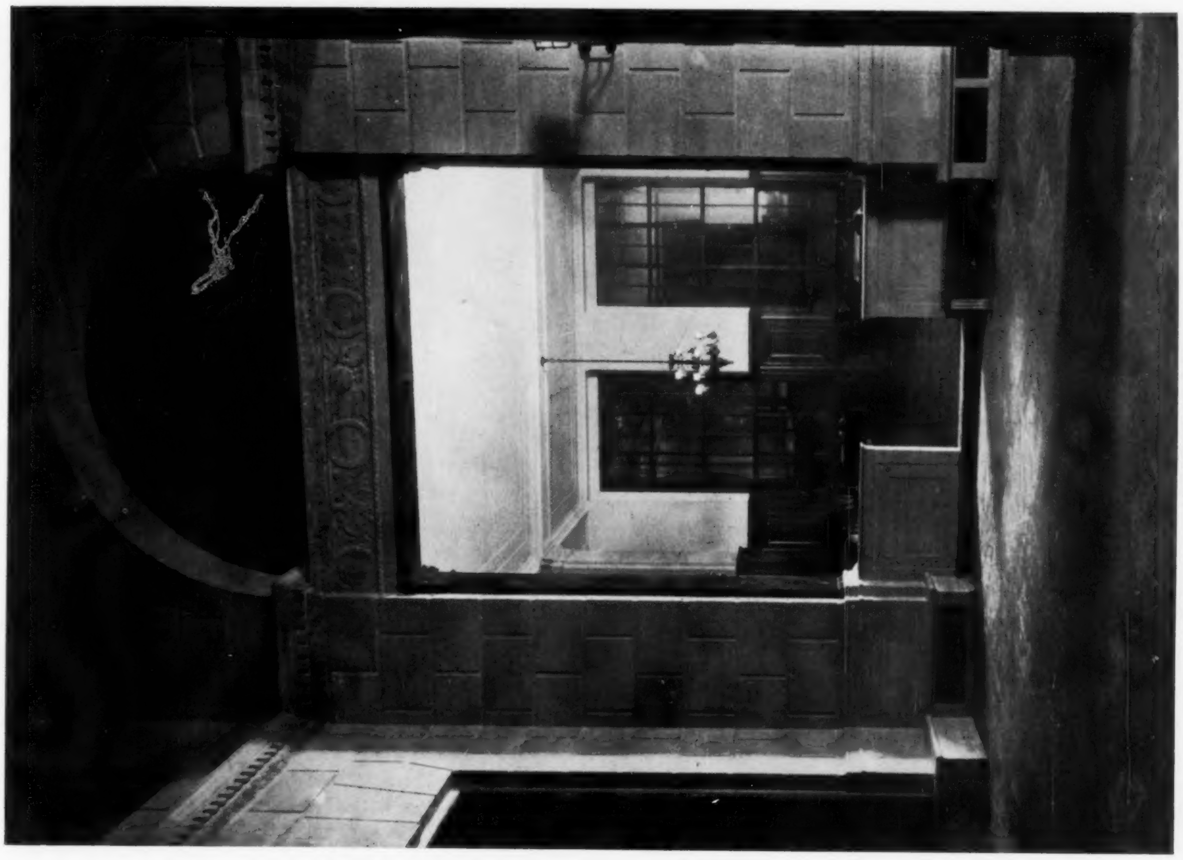


VIEW TOWARD PAYING TELLER'S CAGE

BANKING ROOM, NEW YORK TRUST COMPANY, NEW YORK

WALKER & GILLETTE, ARCHITECTS

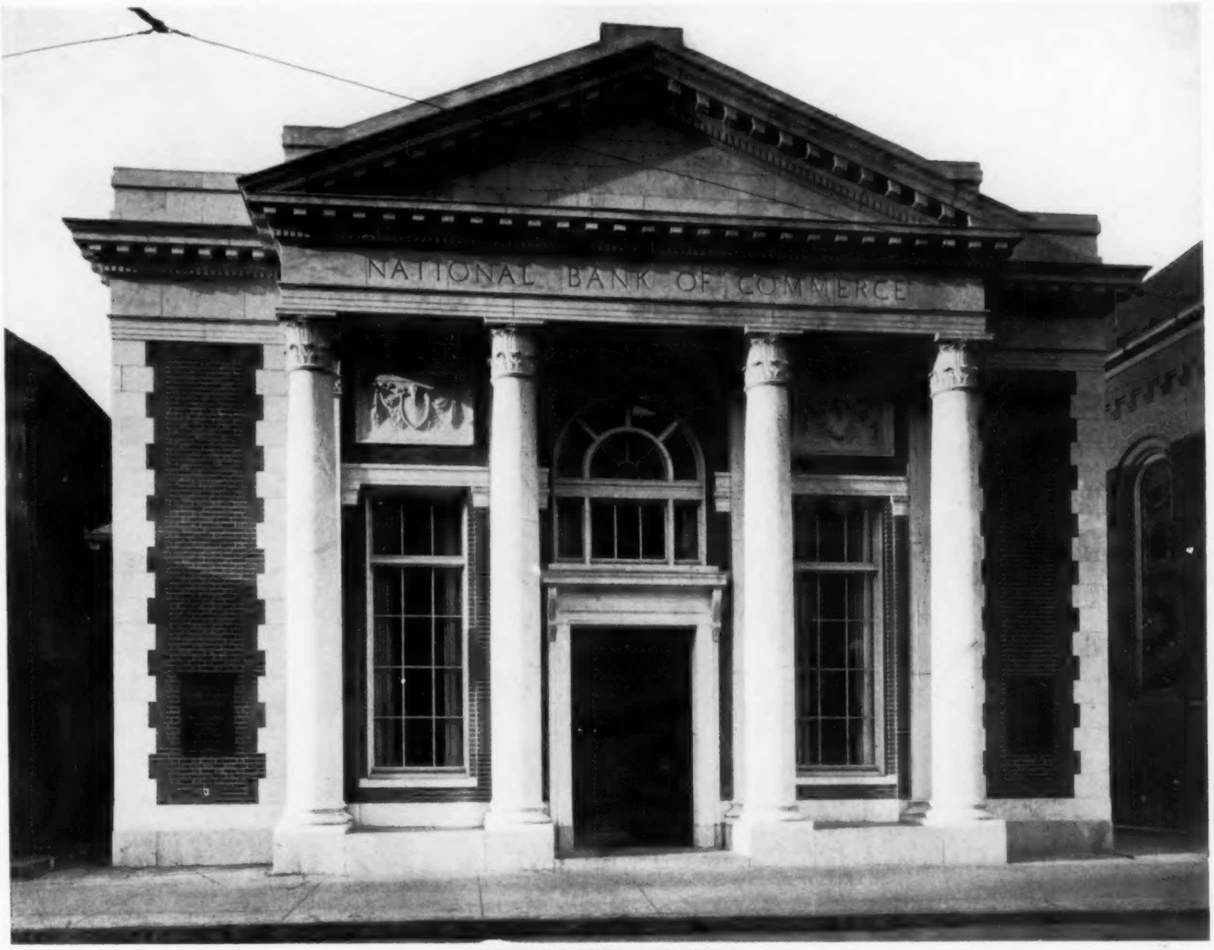
DETAIL OF LOBBY



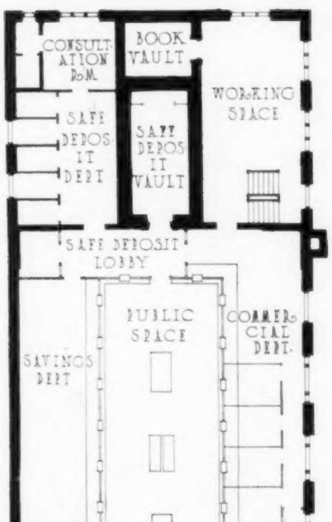
OFFICERS' SPACE

BANKING ROOM, NEW YORK TRUST COMPANY, NEW YORK

WALKER & GILLETTE, ARCHITECTS



GENERAL EXTERIOR VIEW

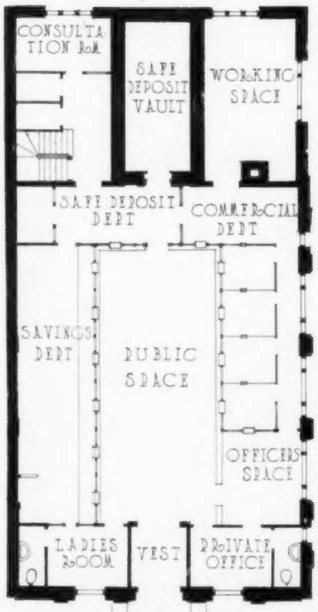


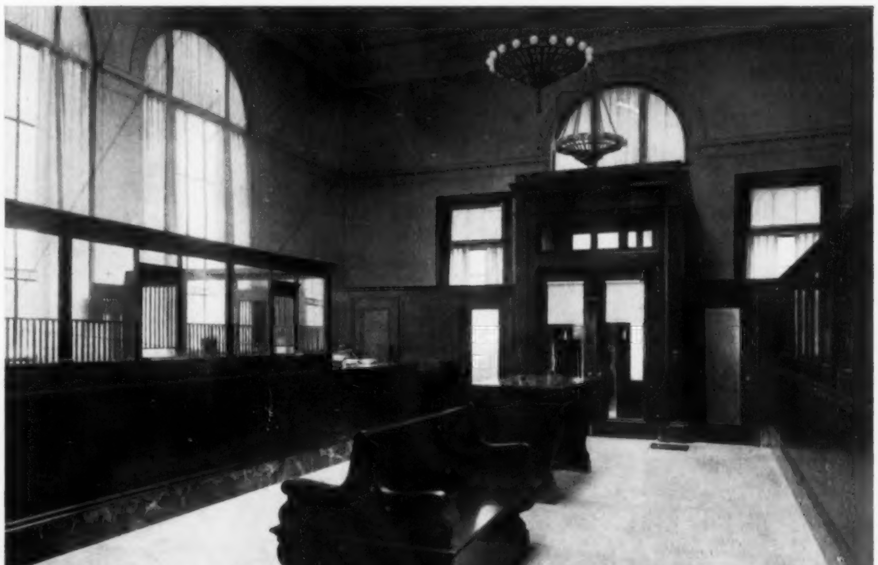
FIRST FLOOR PLAN AND INTERIOR VIEW

NATIONAL BANK OF COMMERCE BUILDING, NEW LONDON, CONN.

THOMAS M. JAMES, ARCHITECT

GENERAL EXTERIOR VIEW

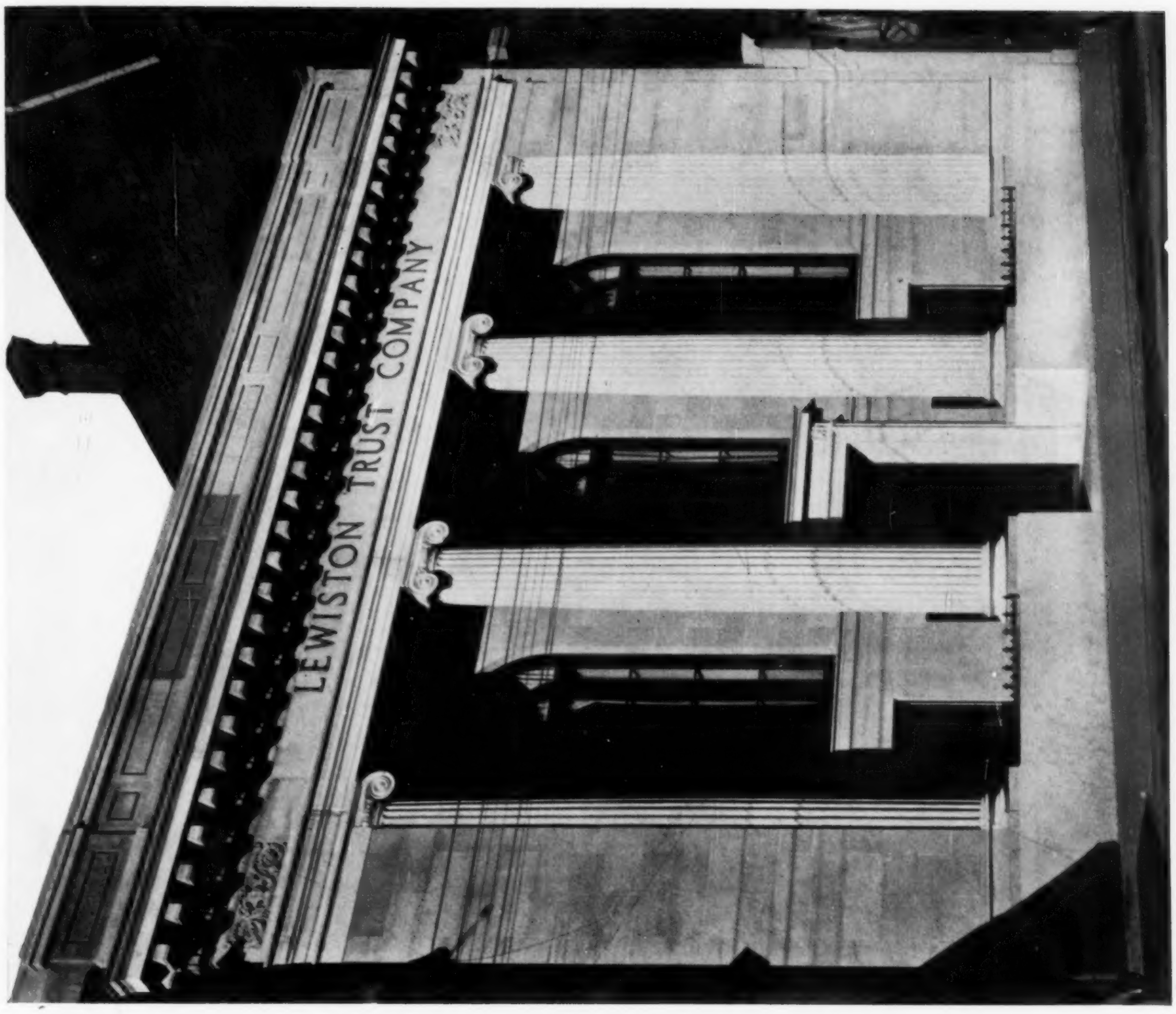




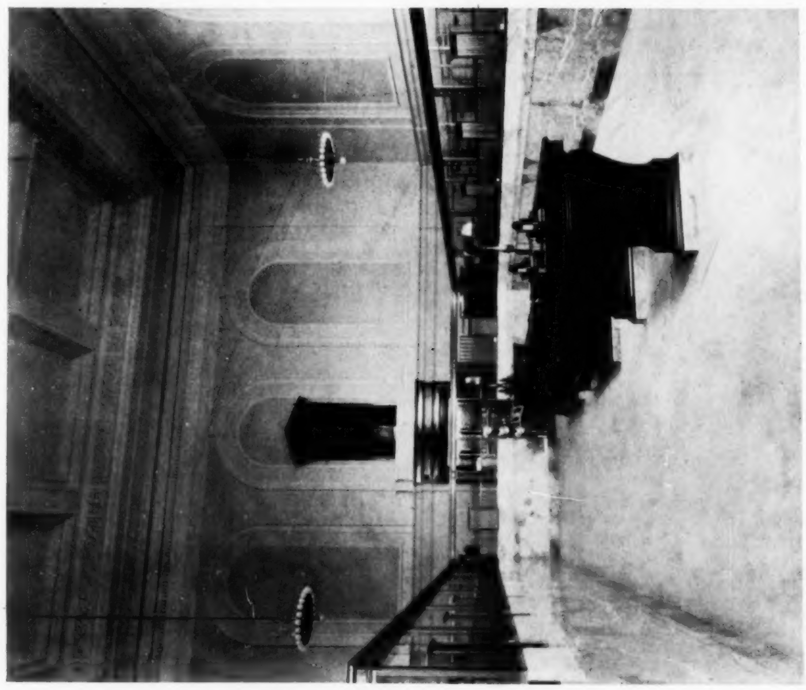
FIRST FLOOR PLAN AND INTERIOR VIEW

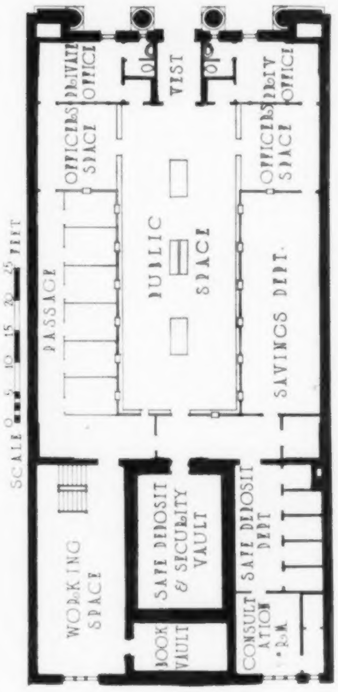
FIRST NATIONAL BANK BUILDING, BIDDEFORD, MAINE

THOMAS M. JAMES, ARCHITECT



GENERAL EXTERIOR VIEW



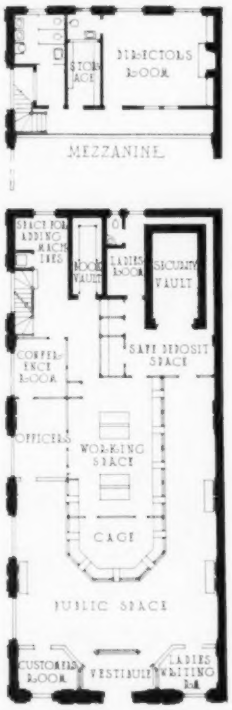


FLOOR PLAN AND INTERIOR VIEW

LEWISTON TRUST COMPANY BUILDING, LEWISTON, MAINE

THOMAS M. JAMES, ARCHITECT

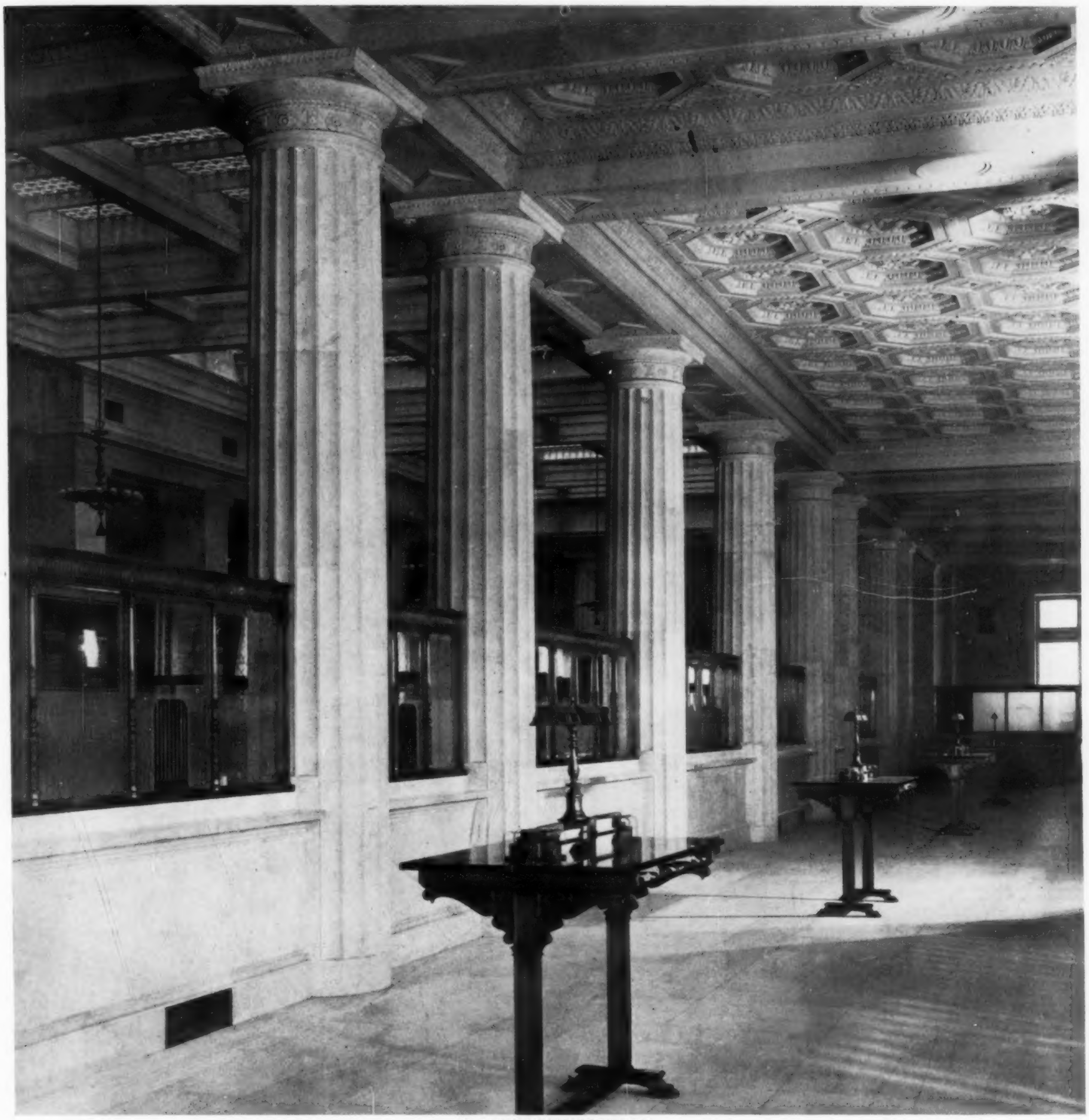
GENERAL EXTERIOR VIEW



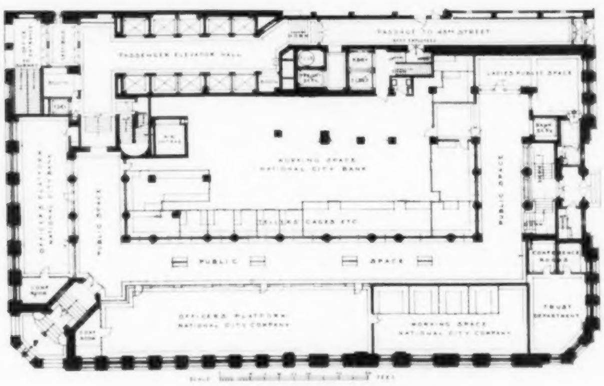
FLOOR PLANS AND INTERIOR VIEW

FIRST NATIONAL BANK BUILDING, SOUTH AMBOY, N. J.

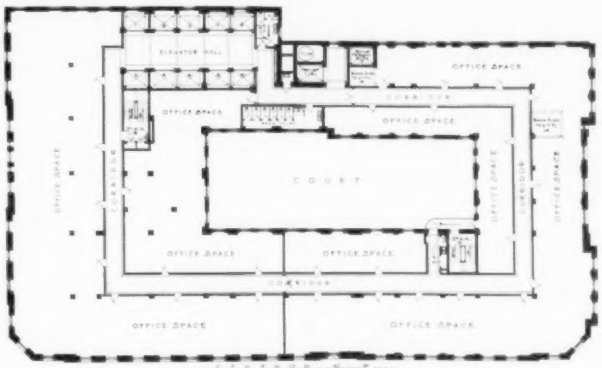
HOLMES & WINSLOW, ARCHITECTS



VIEW IN PUBLIC SPACE



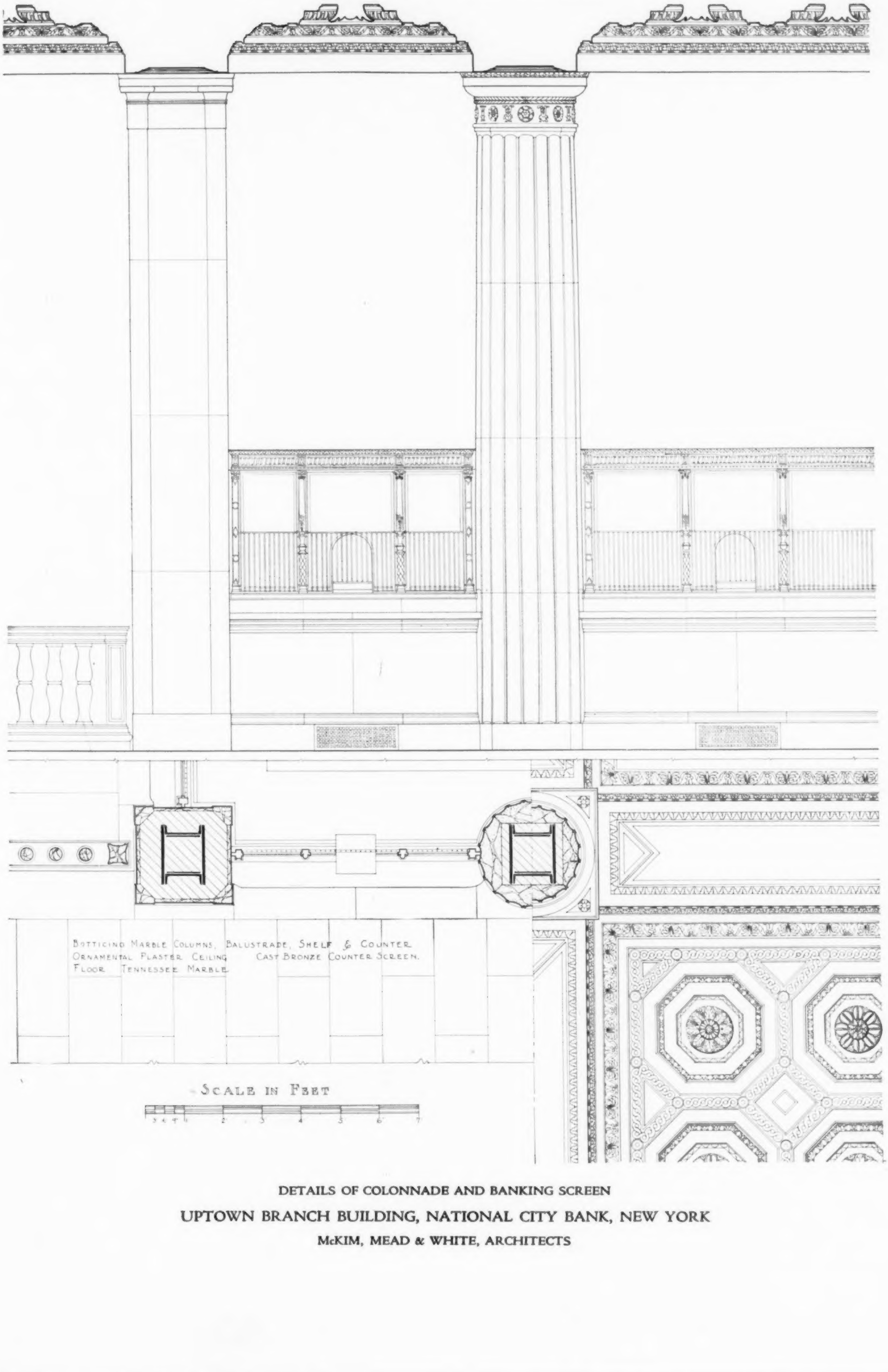
FIRST FLOOR PLAN



TYPICAL OFFICE FLOOR PLAN

UPTOWN BRANCH BUILDING, NATIONAL CITY BANK, NEW YORK

McKIM, MEAD & WHITE, ARCHITECTS



DETAILS OF COLONNADE AND BANKING SCREEN

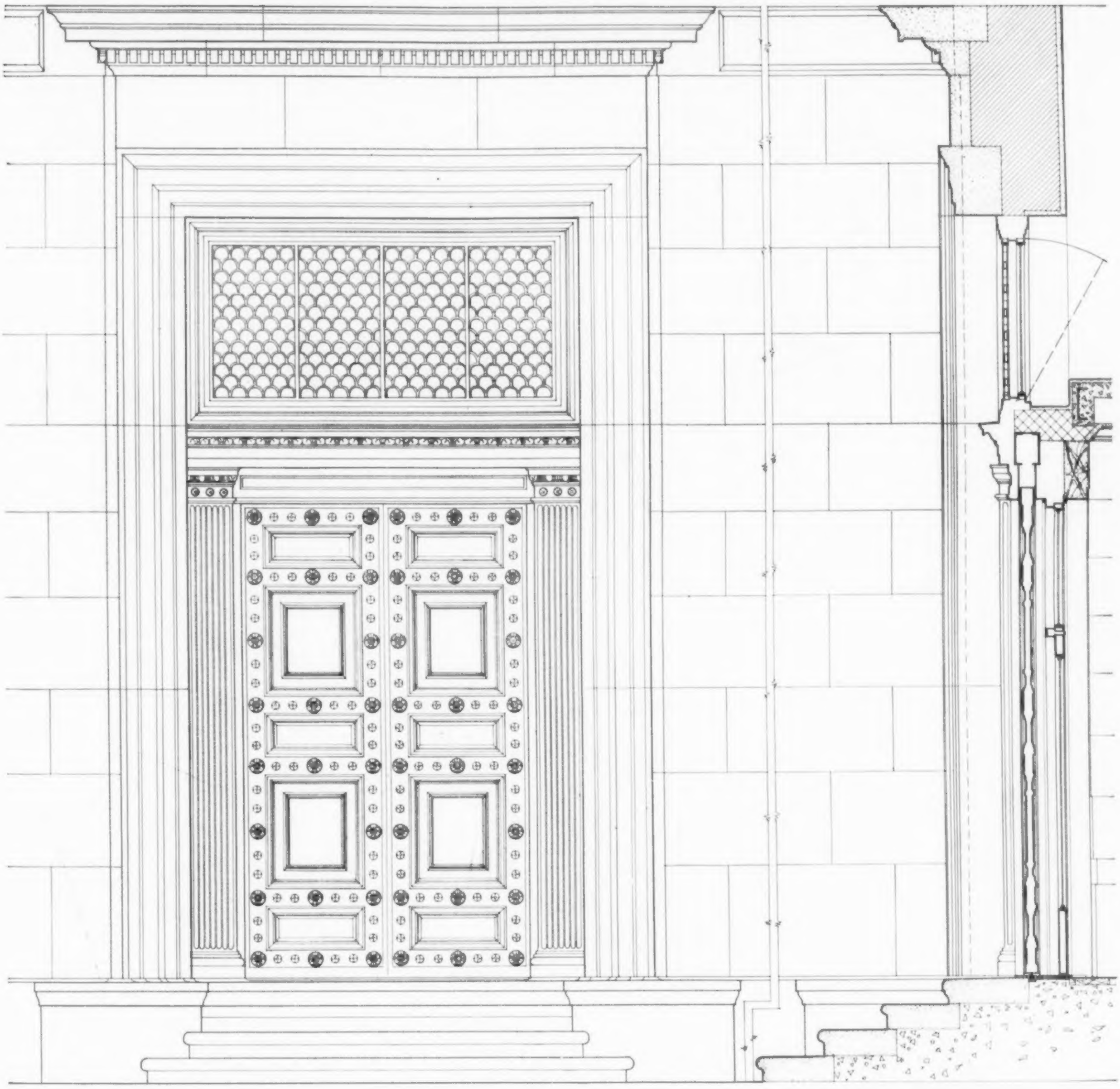
UPTOWN BRANCH BUILDING, NATIONAL CITY BANK, NEW YORK

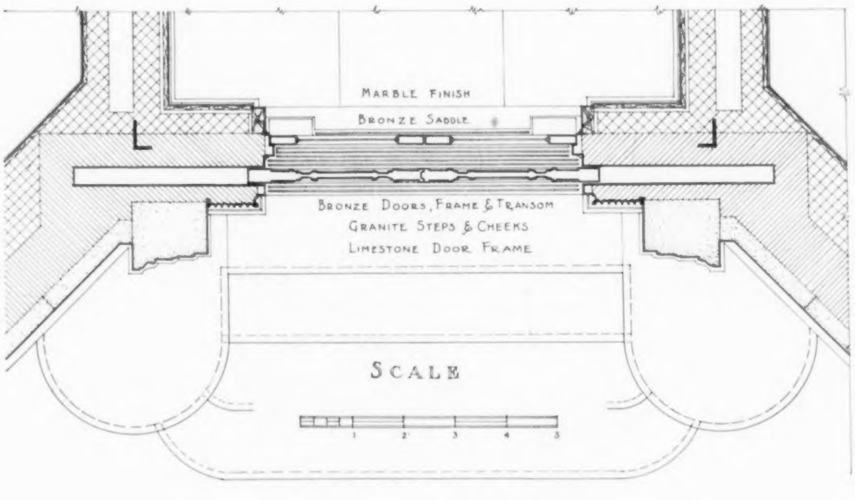
McKIM, MEAD & WHITE, ARCHITECTS

DETAIL OF OFFICERS' SPACE

UPTOWN BRANCH BUILDING, NATIONAL CITY BANK, NEW YORK

McKIM, MEAD & WHITE, ARCHITECTS

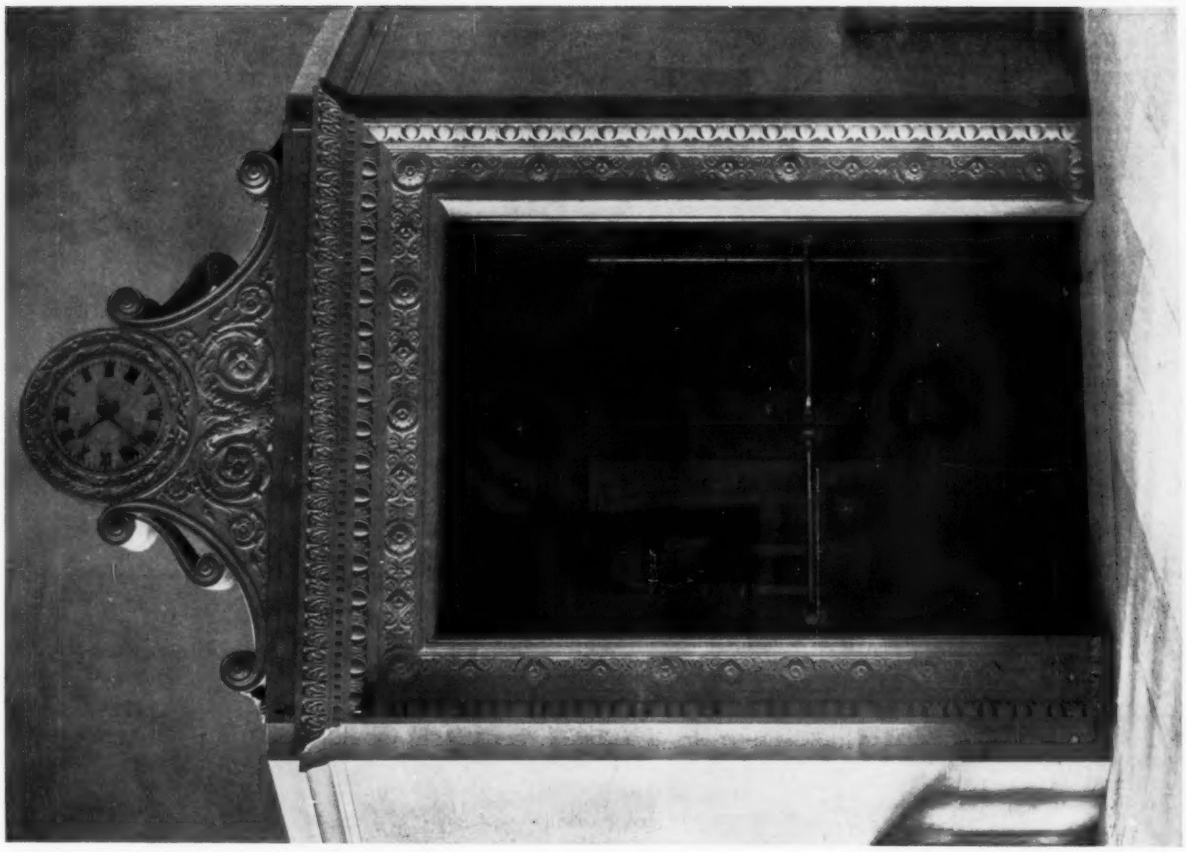


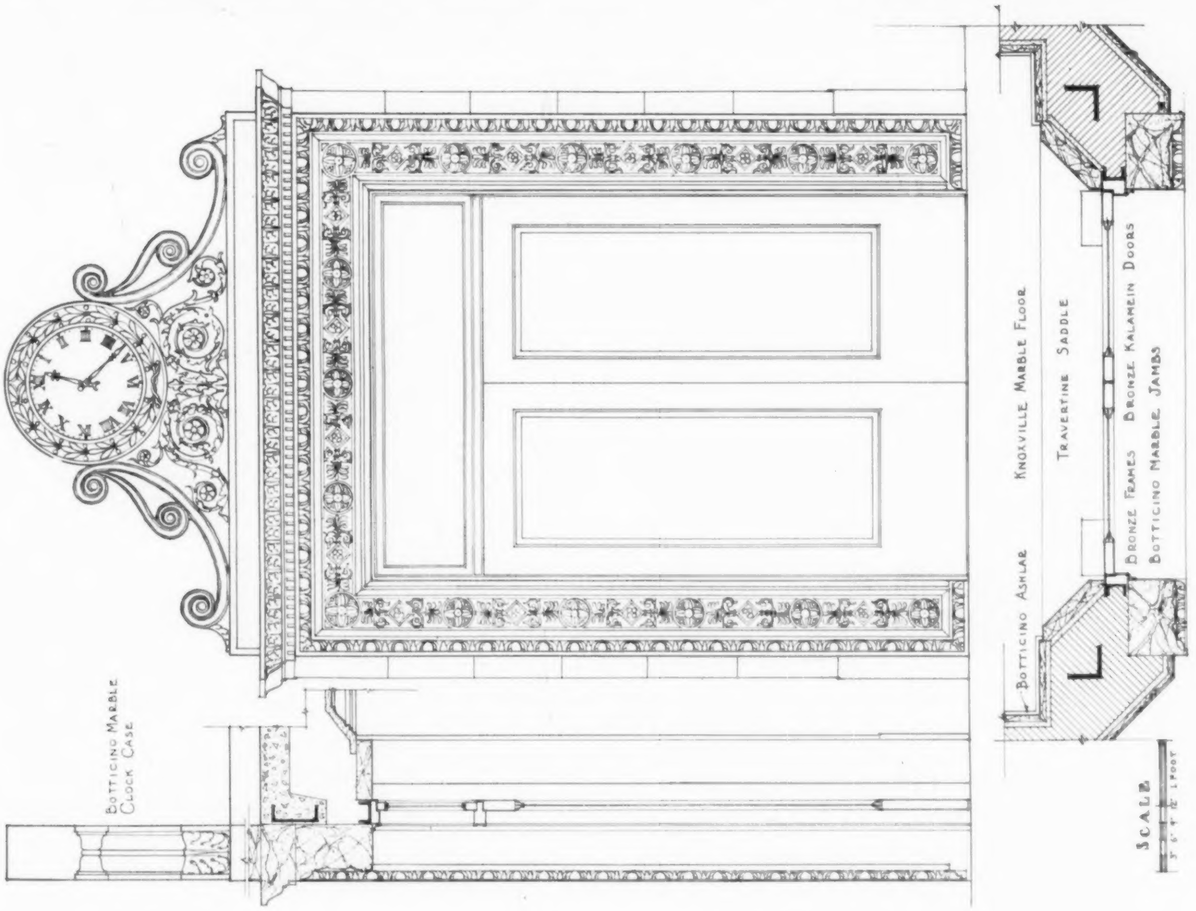


EXTERIOR DETAILS OF MAIN ENTRANCE

UPTOWN BRANCH BUILDING, NATIONAL CITY BANK, NEW YORK

McKIM, MEAD & WHITE, ARCHITECTS





INTERIOR DETAILS OF MAIN ENTRANCE

UPTOWN BRANCH BUILDING, NATIONAL CITY BANK, NEW YORK

McKIM, MEAD & WHITE, ARCHITECTS

ENGINEERING DEPARTMENT

Charles A. Whittemore, *Associate Editor*

Systems for Building Heating and Domestic Hot Water Supply

PART II

By JAMES A. McHOLLAN, *Vice-president,*
The R. P. Bolton Company, Consulting Engineers

IN addition to the services of building heating and hot water supply, discussed in the December issue, steam may be required for restaurant, laundry or manufacturing purposes. In buildings equipped for the production of electric light and power, the steam required for these services is obtained direct from the main boilers. In buildings for which the electric light and power is purchased, and in which the heating boilers should operate at low pressure, new methods of providing steam for these services have been found economical, and information regarding them will be of interest to architects and engineers.

RESTAURANTS AND KITCHENS.—Cooking appliances may be gas- or steam-operated. Ranges are operated by gas, coal or electricity, but in these varieties of apparatus, found in almost every kitchen, either gas or steam must be used in operation:

Stock kettles	Vegetable steamers
Coffee urns	Clam, lobster or potato steamers
Steam tables	Egg boilers
Plate and cup warmers	

Gas is being successfully used under all these appliances and appears to be coming into more general use. If steam is to be supplied it is not necessary that the supply be at high pressure. If the piping system is made large enough, low pressure steam at a pressure not exceeding 10 lbs. per sq. in. will cook effectively and economically. Higher pressures used in existing installations, ranging from 30 to 80 lbs. per sq. in., are unnecessary, and they sometimes require the presence of a licensed engineer in attendance.

These figures deal with the quantities of steam consumed by kitchen devices and may be used in arriving at the sizes of steam boilers required:

Appliance	Steam-used boiler; horse power per hour
Stock kettles (per 10 gals.)	.5
Coffee urns, etc. (per gal.)	.1
Steam tables (per ft.)	.2
Plate and cup warmers (per 20 cu. ft.)	1.0
Vegetable steamers (per compartment)	1.0
Clam, lobster or potato steamers	1.0
3-compartment egg boilers	.5
Jets for sinks—½-in.	1.0
Bain Marie (per ft.)	.5
2-compartment tube type dish washers	2.0
Dish washers of the conveyor or roller type	2.0

This table shows the sizes of supply and return steam pipes to kitchen appliances to be operated with low pressure steam:

Appliance	Supply pipe (inches)	Return pipe (inches)
Stock kettles (40 gals.)	1¼	1
Coffee urns (6 gals.)	¾	¾
Bain Marie (36 ins. long)	1¼	1
Plate and cup warmers (20 cu. ft.)	1	¾
Vegetable steamers (per compartment)	1	
Clam, lobster or potato steamers	1	
Egg boilers (3-compartment)	¾	

In addition to these devices, a supply of steam should be provided at silver sinks and dish washing machines, unless a hot water supply at about 180° Fahr. is provided. If hot water of lower temperature is supplied, it is necessary to inject steam to raise the temperature so that silver and dish cleaning may be quickly and properly done.

These results of observations show the actual amounts of steam used in a large restaurant kitchen, in relation to the number of persons served. Steam was measured over a period of four days.

Time of kitchen operation	Hours per day	Average lbs. steam per hour	Lbs. steam per day	No. of persons served	Lbs. steam per person served
7 a.m.—1 a.m.	18	332	5976	1705	3.5
7 a.m.—1 a.m.	18	330	5940	1548	3.78
7 a.m.—1 a.m.	18	299	5382	596	9.04
7 a.m.—1 a.m.	18	319	5742	1114	5.16

Average steam used per hour of kitchen operation . . . . 320 lbs.
Steam used per person served . . . . 4.64 lbs.

These observations show a certain relation to the number of persons served, although as might be expected the usage per person is lower on busy days.

STEAM IN LAUNDRIES.—In a hotel, club or institutional building a laundry is usually provided and a supply of high pressure steam is required in the operation of mangles and pressing and ironing machines. The steam pressure required varies from 70 to 100 lbs. per sq. in. For drying rooms, drying tumblers, starch kettles and washing machine, it is only necessary to provide a low pressure steam supply.

Unless coal- or oil-fired high pressure boilers to provide steam to produce electric power are to be installed in a new building, in which case steam for

the mangles and ironers is obtained direct, the proper usage is to install an individual gas-fired boiler for the laundry service. Even with manufactured gas at prices over $1 per 1,000 cu. ft., these boilers have proved economical. Operation is automatic; city regulations do not require a licensed engineer in attendance, and the cost of operation is lower than might be expected as the boiler is in service only when the mangles or ironers are being used. Washing machines in laundries require very hot water. Some operators insist that the water should be practically at boiling point, yet in some laundries the washing is done with water at as low a temperature as 170°. A supply of low pressure steam to the washing machines can be used to raise the water temperature, although this is usually wasteful in operation.

STEAM FOR MANUFACTURING.—In loft and manufacturing buildings, in which printing, chemical processes, hat making and other similar kinds of business are carried on, high pressure steam may be required. The use of the automatic gas-fired boiler in such cases cannot be too strongly advocated. The boilers can be installed after the building is erected, proportioned to the tenants' demands for steam, and placed under their control. The gas supply can be metered and each tenant charged in proportion to the amount used. In loft and manufacturing buildings, a main gas supply pipe of 4 ins. from the street mains should be arranged for. A main rising line 3 ins. in diameter should be erected with outlets at each floor. Thus equipped, the needs of future tenants for steam supply for industrial processes can be taken care of in the way most economical to the building owner.

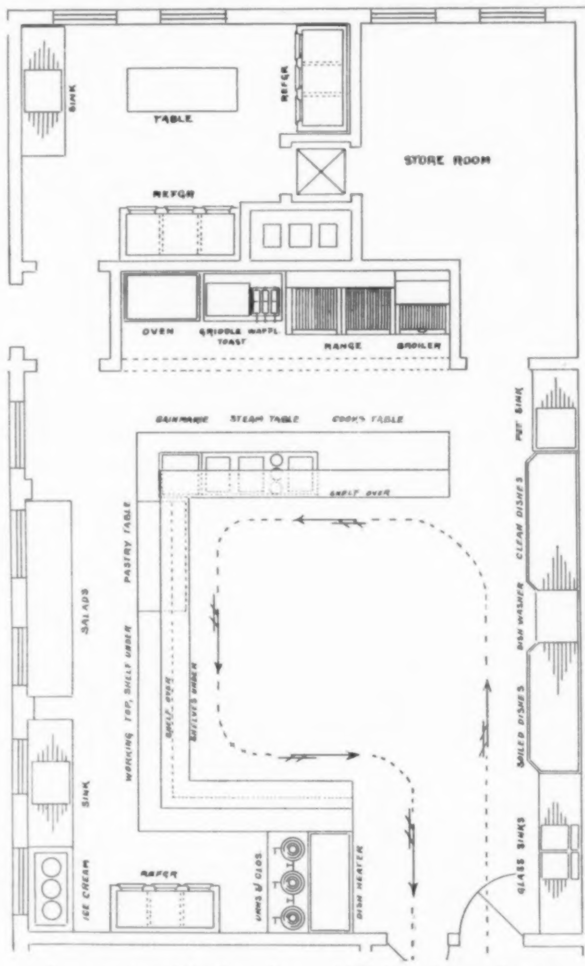
DATA ON GAS-FIRED BOILERS.—This table gives data on maximum gas consumption and sizes of supply pipes for gas-fired boilers:

Size of boiler; horse power	Maximum hourly consumption cu. ft. gas	Size of service supply pipe; diameter in ins.
5	375	1½
10	750	2
15	1125	2
20	1500	2½
25	1875	2½
30	2250	3
35	2625	3
40	3000	3
45	3375	4
50	3750	4

A summary of the systems of steam supply in new buildings in which it is planned to purchase electric light and power may be of interest.

BUILDING HEATING.—Gas-fired, low pressure heating boilers in residences and small office buildings. Coal-fired, low pressure heating boilers in larger buildings. Vacuum or hot water heating systems should be adopted.

HOT WATER SUPPLY.—Gas-fired boilers for summer use. In winter, steam to be obtained from building heating boilers. Water temperature should be automatically controlled at heating tanks. Temperature of water leaving tank should be from 140° to 150° Fahr. Higher temperatures use more fuel and accelerate corrosion of piping. In kitchens and laundries, provide auxiliary heaters to raise temperature of hot water to about 190°, or arrange for supply of low pressure steam to individual appliances to mix with and raise temperature of water. Provide apparatus for de-activating water or other devices capable of arresting corrosion in hot water piping system.



All-gas Equipped Kitchen, Rogers Hall School, Lowell, Mass.
Kitchen proper 25 ft. x 25 ft. 6 ins. Accommodations for 250 people
Cram & Ferguson, Architects

KITCHEN.—Either gas-operated appliances or low pressure steam for cooking. If steam is used, provide gas-fired steams boiler for summer use. In winter, steam for cooking is to be obtained from building heating boilers.

LAUNDRY.—Gas-fired automatic boilers, operating at 100 lbs. pressure to operate mangles, ironing and pressing machines. These boilers also to provide steam to dryers, starch kettles and washers unless a supply of low pressure steam is available from the building heating boilers.

MANUFACTURING PROCESSES.—Install gas-fired, high pressure boilers on the floors, besides the machines in which steam is to be used. Install proper sized gas piping to allow for installation of boilers when tenants' demands for steam are known or in event of changes in occupancy.

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Electrical Wiring Layouts for Modern Buildings

PART I

By NELSON C. ROSS
Associate Member, A.I.E.E.

DURING the past year the writer has been asked by a number of architectural and engineering draftsmen where they could obtain a book, written in non-technical terms, that would give them a working knowledge of the electrical wiring layouts and equipment which are required in our modern buildings — something which would give them sufficient understanding of the subject to enable them to talk intelligently with electrical contractors doing work under the direction of their offices, to help them to become familiar with the different construction details of the work, and above all to be of assistance in the preparing of plans and specifications covering this type of equipment. While books covering all branches of electrical science are readily obtainable, to the best of the writer's knowledge, no work of the kind described exists, and it is the intention that these papers will, as far as is possible, furnish this information in the form required.

It is not the intention that these papers will be in any way technical, but rather descriptive of wiring layouts; each type of building is to be considered in turn, a typical layout described, and simple wiring diagrams furnished, so that anyone conversant with building plans may understand the details of the different layouts and the specifications covering the work. The layouts hereinafter described will, as far as is possible, be complete for each class of building, including circuit wiring and equipment. In the use of the schedules, tables and other information, however, judgment must be used, and this checked as far as possible by experience, as the buildings will require equipment and circuiting in proportion to the uses to which they are to be put.

Each building is a separate problem and must have separate treatment, as two buildings, particularly with reference to schools, even if built from the same plans, may require different wiring and equipment, depending upon whether the courses taught are industrial, commercial, academic or scientific, or whether any combination of these courses is taught in the same building. Again, the volume and control of the lighting will depend upon whether the building is to be used only for day work, or whether it is to be used also at night. In all cases, however, before any work on the plans is begun, it is advisable to get all possible information as to the use of the building and to proportion the wiring circuits and equipment accordingly.

Electrical Terms

Before taking up the discussion of the different wiring systems and equipment, however, it may be well to consider the meaning of the electrical terms in common use, as well as their application to the work. We are often told that the electrical service on a certain street, or in a certain town, is delivered at 110 volts or 220 volts, and in another town at 500 volts or 2300 volts, while power may be delivered over a three-phase alternating current circuit or a direct current circuit, until the terms become confused and are not well understood.

It may be said that on interior wiring layouts we are seldom required to consider high voltage, excepting possibly on the service wires, and this only when primary service is carried into the building and connected to a transformer bank. As a rule the voltage in the building will seldom be higher than 220 volts, and never higher than 550 volts. The latter voltage is used only on motor circuits.

The electrical terms with which we are chiefly concerned are the "voltage or pressure on the circuits," the "amperes or current flowing in the circuits," the "resistance of the wiring circuits and of the apparatus connected," the "wattage required for the lamps and equipment," and the "characteristics of the available electrical service for the building."

The "volt" is the unit of electrical pressure, just as the pound is the unit of steam pressure. On a steam plant or in a system of steam piping, the higher the steam pressure that is used in the system the greater becomes the strain on the boilers, equipment and piping, requiring heavier steam pipe and fittings, and greater care and skill in the installation of the work. Likewise on electrical wiring systems, the higher the voltage used the greater becomes the strain or stress on the wires and equipment, thus requiring a higher grade of insulation, greater spacings between exposed terminals, and greater care in the installation of the wires and equipment.

Broadly, the reason for the use of high pressures on either steam or electrical transmission lines is that, other things being equal, the higher the pressure used the greater becomes the over-all economy of operation. Again, as will be explained later, the greater the pressure used on the line the greater becomes the amount of power that can be delivered over a wire or through a steam pipe of a given size. And of course, with the use of smaller piping or smaller wire, the lower becomes the cost of installation. It is common engineering practice to operate cast iron heating boilers at from 5 lbs. to 15 lbs. pressure. Medium pressure boilers are operated at from 90 lbs. to 110 lbs. pressure, while certain types of marine boilers and large boilers in central power stations are often operated at pressures as high as 250 lbs. Likewise, on electrical wiring systems, low tension equipment, including bells, clocks, time recording systems, telephones, signaling devices, etc., is operated on pressures ranging from 5 volts to

30 volts, the service taken from primary battery, storage battery, or from motor-driven generating units. Incandescent lamps, flatirons, toasters, heating equipment and other electrical devices in domestic use are as a rule operated on a pressure of 110 volts, this pressure being standard on both direct and alternating current circuits.

Small motors are operated on both 110-volt and 220-volt circuits, on both alternating and direct current. 440 and 550 volts are standard pressures for alternating current motors. Very large alternating current motors of the synchronous type are operated direct from the transmission lines, without transformers, at pressures as high as 5,000 volts, while pressures used on certain transmission lines may be as high as 66,000 volts. Such pressures, however, are used only in connection with long distance power transmission.

The "ampere" is the electrical unit of current, and the ampere load may be considered as the volume of electrical energy flowing in the circuits. In water systems, when a large amount of water is required, a large pipe must be used to carry this water. Likewise, on electrical circuits, the greater the current required the larger must be the size of the wire to carry this current. The ampere load or current flowing in the circuits is of importance, as the volume of current determines the size of the wires in the feeder systems, and hence influences the cost of construction.

The "ohm" is the unit of electrical resistance, and may be regarded as the amount of resistance that will permit one ampere to flow in a circuit under a pressure of one volt. The equation $I = \frac{E}{R}$ is known as Ohm's law, and this equation shows the relation which the three electrical units bear to each other:

Where I = the current strength, or amperes,
E = the electromotive-force, or voltage,
R = resistance,

or $\frac{\text{voltage}}{\text{resistance}} = \text{amperes}$, $\frac{\text{voltage}}{\text{amperes}} = \text{resistance}$, and amperes $\times$ resistance = voltage.

The "watt" is the unit of electrical power and is the product of the current and pressure, or the amperes flowing in a circuit multiplied by the voltage of the circuit. Thus, in a circuit carrying 10 amperes under a pressure of 110 volts, the watts would be, 10 amperes x 110 volts = 1100 watts.

The "kilowatt" equals 1000 watts, and is the unit upon which all charge for electrical energy is now based.

The "electrical horsepower" equals 746 watts and is equivalent to the mechanical horsepower of 33,000 foot-pounds.

The "watt-hour" equals one watt maintained through the period of one hour.

If we were to purchase an electrical generator, capable of operating 100 lamps continuously, and each lamp consumed 100 watts, the capacity of the generator required must be 100 lamps times 100 watts, or 10,000 watts, or 10-kilowatt (k.w.) capacity. Again, if we were to operate 100 lamps on an electrical circuit for one hour, and each lamp consumed 100 watts per hour, the consumption of energy would be 100 lamps times 100 watts, times one hour, or 10,000 watt-hours, or 10 k.w. hours, and if we were paying 5 cents per k.w. hour for energy, the cost of operating these lamps for one hour would be 10 k.w. hours times 5 cents, or 50 cents. If operated for two hours the cost would be twice as much or $1, and if operated for one-half hour, the cost would be one-half as much, or 25 cents.

Service and Voltage

We are asked why one voltage is used on one plant and a different voltage used on another plant; also why a building in one district is served by alternating current, while a similar building in another district is served with a direct current. It may be said that all modern central station distributing circuits use alternating current where electrical energy is transmitted over distances exceeding 2,000 or 3,000 feet. The reason is that the characteristics of alternating current are such that the voltage or pressure can be raised or lowered by means of transformers, thus permitting the use of high transmission voltage, with consequent small wires, to carry the current from the generating station to the points where the energy is to be used, and at these points the pressure can be again lowered through step-down transformers to the voltage required.

Direct current voltage cannot be raised and lowered as just described without the aid of moving apparatus, and the characteristics of direct current are such that it is not advisable to generate at pressure higher than 550 volts. Direct current systems were in use, however, long before the alternating systems were developed, and direct current is still used on circuits operated by private generating plants where the distances over which the energy is to be transmitted are comparatively short. When direct current electric lighting service was first installed in the larger cities, the three-wire system of distribution, using pressures of 110–220 volts, was developed, and the current generated at this pressure. The generating stations were located in different sections of the city and an underground cable system installed, forming a network of mains, these mains being connected with the several generating stations.

The direct current systems as a rule cover but a certain area in the heart of the city. On all new installations to supply outlying districts, alternating current is used, and this accounts for the use of direct current in some sections of a city, and the use of alternating current in other sections. In the smaller cities and towns we do not, as a rule, find direct current used on central station circuits, as the use of central station current did not become common in these smaller towns and cities until after the development of alternating current.

The average pressure in use on alternating cur-

rent primary circuits does not exceed the standard pressure of 2,300 volts, and this is transformed at the points of service to 110, 220, 440 or 550 volts, depending upon the type of service that is required. Some of the older plants in the smaller towns, where little or no power service is supplied, are still using the single-phase current, and where motors are required, the single-phase motor is used. This is connected to operate from the lighting circuit, a separate meter being installed for this motor service and a special power rate made the consumer. Certain of the larger cities are still using the two-phase system for power service, with single-phase circuits for lighting service, the lighting service being taken from either phase of the two-phase system. The more modern plants, however, standardize on the three-phase system for power and the single-phase system for lighting, the lighting service being taken from either of the three phases of the system.

The two-phase system is seldom considered on new installations as the three-phase system is more economical and requires less copper in the transmission lines than the two-phase system. It may be said that alternating current motors are designed to operate on single-phase, two-phase or three-phase circuits, respectively, and at any standard voltage. The two-phase and three-phase motors will operate only on the two-phase and three-phase circuits, respectively. The single-phase motor will, however, operate on any one of the phases of the two- or three-phase circuit, provided it is designed for the voltage of the circuit to which it is connected. Direct current motors will not operate on alternating current circuits, nor will alternating current motors operate on direct current circuits. Lamps and heating devices, however, will operate equally well on either alternating or direct current circuits if of the proper voltage.

The Underwriters' Rules

All electrical wiring circuits using pressures greater than 10 volts must be installed in accordance with the rules and requirements of the National Board of Fire Underwriters, or the so-called "Underwriters' Rules," and in addition to the rules of the underwriters nearly all of the cities and towns have certain rules and ordinances regarding the installation of electrical wires and equipment which must be observed. Usually the city requirements are based on the rules of the underwriters, although many cities have more rigid requirements for certain fire districts than are required by the underwriters' rules.

Each city or town has an Inspector of Wires, who must keep in touch with all electrical work under his jurisdiction, and who must see that all rules and city ordinances are observed. When work is completed he must make a final inspection, and if the work is satisfactory, will give permission for the work to be connected to the service wires. In the design of any wiring layout it is advisable to get in touch with the Inspector of Wires in the town where the work is to be carried out, and also to confer with the representatives of the service company with reference to the location of the service and the meter requirements, as well as the type of the service to be supplied, in order that there may be no misunderstanding when the construction work is under way.

Electrical fittings, equipment, wires and other electrical materials pertaining to electrical wiring must have the approval of the underwriters' laboratories, and bear the underwriters' stamp of approval before they may be installed. The underwriters' rules cover the construction requirements on all types of electrical wiring circuits, both on low, medium and high voltage systems of distribution; they also include tables showing the current-carrying capacity of the different sizes of wire, fuses and switches, etc., and these rules must be strictly adhered to in the installation of the work. The rules are the results of the experience of years, and are intended to insure construction work that is safe both from the standpoint of danger to life as well as from fire hazard. The underwriters' rules, however, are not intended to cover the exact methods of installing the conduits, wires and other fittings, or the details of the work to be carried out at each outlet, as such details must be left to the skill and experience of those who are laying out the system and to the men who actually make the installation. The type of construction, however, as well as all wires and equipment that are installed, must conform to the requirements of the rules, in order to insure a satisfactory installation.

Early Methods of Construction

In the early development of interior electrical wiring systems, the matter of fire hazard was not well understood; high grade rubber insulation was unknown, switches, fuses and other current-carrying devices were of the crudest type, made up on wooden bases and with shells not always insulated from the current-carrying parts of sockets and fixtures. Fuses were of the open type and the wiring circuits were installed on the ceilings and walls, using weatherproof wire supported on wooden cleats. Where the circuits passed through walls and floors, they were protected only with a short piece of fiber or paper tubing, and no protection was given to the circuits from mechanical injury. As a result, many disastrous fires were caused by defective wiring and equipment, as well as from the lack of care and experience in the installation of the work.

As the appearance of exposed cleat construction on the ceilings and walls was unsightly, it was soon demanded that the circuits be concealed; this led to the development of wood mouldings in which the wires were carried, and also led to the concealing of the circuits, in buildings of frame construction. On new buildings of frame construction the wires were installed in the interior of the walls and floors, being supported on cleats or knobs, which in turn were secured to the floor timbers, etc., and where

passing through walls were protected by short pieces of vulcanized paper tubing. Later, porcelain knobs and tubes were substituted for wood, and the use of porcelain became universal for the bases of switches and other small electrical devices.

On buildings of masonry construction the wires were concealed in fiber conduits or brass-armored paper tubing; this tubing was also installed on exposed work, being stapled to the walls, etc., and the wires drawn in to the tubes. Where concealed wiring was first installed in existing frame buildings (old work), the wires were simply fished into the construction without protection other than the insulation, the floors being pocketed to permit this to be done; tap circuits were made in the concealed spaces and the taps run through the ceilings and connected to the fixtures. Later, this method proving unsatisfactory, flexible fiber tubes were used for protection, these being slipped over the wires before they were drawn into the building construction.

As the use of electrical power became more general and the wiring systems became larger, the danger of fire from these types of construction became apparent. Porcelain, slate, marble and other non-absorbent materials took the place of wood, on switches and other equipment; further, construction materials became standardized, and rules were established covering the methods of electrical construction, which, if followed, will insure an installation which will in no way become a fire hazard to the building.

On the early systems it was customary to carry the service wires from the nearest pole to the attic of the building; brackets and insulators were located on the outside of the structure, the service wires secured to these brackets and then passing through tubes in the building wall to the master switch, which was located in the attic. If a meter was considered for the measurement of the energy consumed, a meter loop was provided at a point near the master switch, while on the other hand the service might be sold at a certain rate per lamp-year.

Present Methods of Construction

Under present methods of construction (on large installations) it is customary to provide a service switchboard or panel at some point in the basement of the building, this panel containing the feeder switches, instruments and protective devices, as well as the recording watt-hour meters of the service company. At times the service switches and the watt-hour meters may be installed separately from the service switchboard, as these meters as a rule are the property of the service company. The service company brings the service wires to a point opposite the property of the consumer at its own expense. From the point of the property line the consumer assumes the expense of the service cables, and these may be installed from the pole to the building underground, or poles may be set on the consumer's property and the lines pass direct from the pole to the building. In the event of the overhead lines passing direct from the pole to the building, a cross arm or brackets are located on the outside wall, and a conduit of ample size to contain the service mains is run from the cross arm or brackets, down, on the outside of the building, to a point at the wall of the basement, thence through the basement wall and terminating at the service switches or switchboard.

As a rule the building is laid out in sections, and the location of lighting outlets, switches, lamps, motors and other equipment carefully considered before the plans are made; then the approximate load is computed, and centers of distribution established for the location of the panel boards. The location of the panel boards is not arbitrary, but these should, building conditions permitting, be located as near as is possible to the centers of distribution on each floor, so that the length of the branch circuits leading from the panels to the outlets may be as short as possible. The feeders, or sub-mains, are run from the service switchboard to the panels, these feeders being controlled from switches on the service switchboard. This method of construction tends to insure good voltage regulation as it equalizes the pressure on the lamps, due to ample feeder copper and comparatively short branch circuits. If the building is square or is built around a light well, there would as a rule be four panels located on each floor, each panel controlling one-fourth of the load, and the four feeders would run from the switchboard to the basement panel at each of the four locations, thence up, looping through the panels on the different floors.

Motor circuits would be grouped and carried back to one or more power panels, each fed from separate power feeders from the switchboard, excepting in the case of very large motors, which would be controlled on separate feeder circuits. Branch circuits would be run from each panel to the outlets and would pick up the different outlets of the lighting system, these outlets to be connected in groups. Each branch circuit is of No. 14 wire and there should be not more than 12 outlets connected to any one branch circuit. Where the wattage of the lamps is known, however, the number of outlets on a circuit should be controlled by this wattage. As a rule, a load of 660 watts is allowed on ordinary branch circuits, although where keyless sockets are used a greater wattage is permitted. If, however, it were determined to use 1,000-watt lamps, not more than one outlet should be connected to a circuit, while if 100-watt lamps were to be used not more than six outlets should be connected on any one circuit.

In the event of a private generating plant being installed in the building, or in an adjacent building, for the operation of the wiring system, the type of construction just described would still be considered, this regardless of whether the wires were installed in conduits, exposed, as on mill construction, finished work, or on knob and tube concealed work.

The National City Bank Building

MADISON AVENUE, 42D AND 43D STREETS, NEW YORK

McKIM, MEAD & WHITE, ARCHITECTS

THE old Manhattan Hotel, which stood for 20 years at the corner of Madison avenue and 42d street, has been converted into an office building, with the lower stories devoted to the uptown branch of the National City Bank and the National City Company.

The casual observer will not see any great change in the familiar exterior. He will note that the building has been sand-blasted, that the old main entrance with its portico and polished granite columns has completely disappeared and that in its stead the small corner entrance, which formerly led to the basement, has been expanded into a quite noble Roman portal, leading to the banking room on the first floor. Then he will observe that the old sidewalk subway entrance has been eliminated and combined with the new office entrance at the west side of the building on 42d street, and that this entrance leads into a corridor which passes between banks of elevators through to 43d street. Also it will appear that the many small windows which marked the hotel bathrooms on the old facades have given place to large office windows Except for these changes, the judicious pruning away of a few

Smaller Public Space Opposite Entrance

Uptown Branch Bank Building, National City Bank, New York

McKim, Mead & White, Architects

outside balconies, and some modifications to the old mansard, the building from the outside looks substantially as before. This problem was clearly not one of the monumental type, but one of adaptation—an adaptation of a hotel, built in two parts, to the needs of a strictly modern bank and office building. We will not dwell upon the difficulties of such a problem nor on the compromises which, of necessity, were accepted, but proceed directly to the solution of what was a difficult problem.

The two courts, or shafts, which formerly gave light and ventilation to the hotel,were thrown into a large central court of about 30 x 90, giving light to the office floors, and by means of a skylight to the central portion of the banking room. This room occupies the entire first floor, with the exception of the elevator hall and entrance. This gives a great room about 100 x 200 in floor area. In order to obtain a large clear space on the Madison avenue side, it was necessary to remove several columns between the two old dining rooms, in the middle of the Madison avenue frontage. This required carrying their loads on a number of 72-inch girders on the second floor, these in turn requiring new columns extending to footings at bed rock.

This banking room is designed to accommodate the uptown branch of the National City Bank and the offices of the National City Company. There are entrances from the corner of 42d street and Madison avenue, from 43d street, and from the office building elevator hall to a generous public aisle. On the street sides of this public space, and separated from it by marble balustrades with bronze gates, are located the platforms for the officers of the bank and of the National City Company, the bond salesmen, and the trust department. The entire central portion of this floor, separated from the public space by a colonnade of 16 marble columns and a marble and bronze counter screen, is given over to the tellers' cages and the clerical working force. This space is splendidly lighted from the great central court above. In the northwest corner of the first floor there is a department for women, with special tellers' and retiring rooms.

Over the public space and the officers' platforms extends a coffered ceiling of ornamental plaster. The walls of the banking room above a Botticino marble base are of artificial stone. The floor of the public space is of Knoxville marble with Travertine borders and steps. The working spaces are floored with cork tile and the carpeted spaces on platforms have cement floors with Travertine borders. Door trim, balustrades, counters and columns are of Botticino marble.

Stairways and elevators at each end of the first floor give access to the quarters of the National City Safe Deposit Company in the basement. The area of the vault is 30 x 60, and it is divided into two stories. Access is by means of two 40-ton vault doors. The walls are of concrete, 18 inches in thickness, heavily reinforced in both directions by steel bars, lined inside with 3 inches of steel plates, and provided over the entire exterior with electric protection. The upper level is devoted to safe deposit boxes, 4,000 of these being provided in varying sizes. Coupon booths and committee rooms to the number of 40 are directly accessible on the basement floor. The lower level is devoted to safe deposit space for the bank's funds and papers, the remainder of the sub-basement being given up to the necessary machinery and other service spaces.

A complete system of mechanical ventilation has been installed for the basement and first floor. The Madison avenue side of the basement has been very simply treated to accommodate the special interest, payroll and foreign exchange departments of the bank, and has new public entrances at both the 42d and 43d street ends and from the subway platform.

As may be seen from the typical floor plan, the layout of the office building is simply of one row of outside offices and one of court offices, served by a dividing corridor of normal width, extending entirely around the floor and passing between the banks of elevators. This corridor in part remains from the old hotel plan. In certain cases, however, where tenants have rented all or a large part of a floor, this corridor is eliminated and the sub-divisions, largely of standard wood and glass office partitions, have been made to suit individual requirements. The entire 14th floor has been leased by the Uptown Club and designed to meet their requirements with extensive dining rooms, reception rooms and elaborately equipped kitchen service with necessary auxiliary rooms.

A few words about the material used may be interesting. As far as practicable in the office portion, old material was refinished and re-used. In general, however, all that remains of the old building is the outside shell, somewhat modified, together with most of the steel frame and floor arches, part of the interior court walls, the old bedroom doors in offices, and a small portion of the mechanical equipment. The new materials are principally standard and limited by cost; for offices, cement floors and cove bases throughout; office corridors, terrazzo floors with domestic marble bases; lining of elevator halls, Botticino marble, and skylights are of vault light construction.

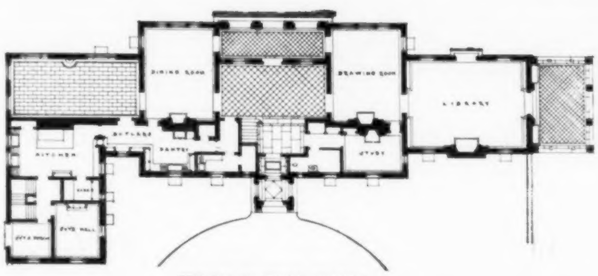
On the first floor the change is quite complete. We find all the vestibules and halls lined with Botticino marble, Tennessee marble floors, Travertine steps and a barrel vault with ornamented plaster coffers in the elevator hall. Extensive use has been made of steel combination buck and frame for doors and windows, thus eliminating trim. The alterations have involved the transformation of a building planned for one definite, specific purpose into a structure equally well adapted to a purpose wholly different, and the building possesses that combination of solidity and architectural dignity which fittingly symbolizes that strength and power which belong to a great financial institution.

ENTRANCE FRONT FROM THE GARDEN

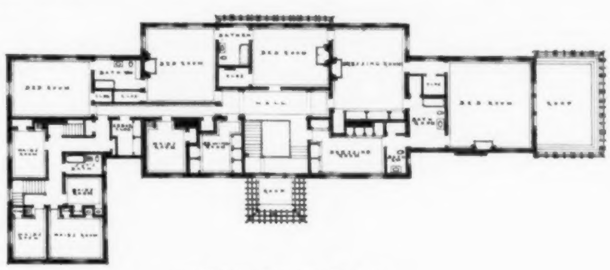
HOUSE OF RICHARD GARLICK, ESQ., YOUNGSTOWN, OHIO

CHARLES A. PLATT, ARCHITECT

ENTRANCE FRONT



FIRST FLOOR PLAN

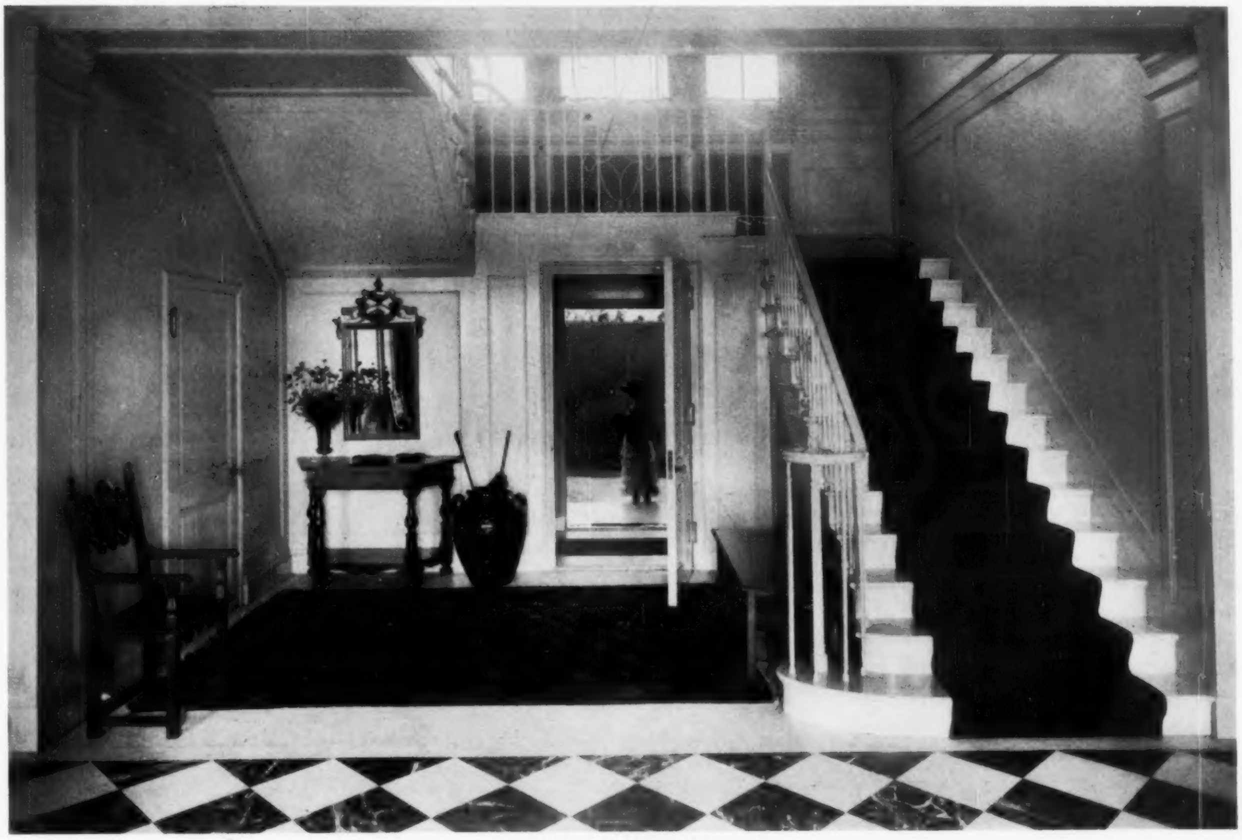


SECOND FLOOR PLAN

TERRACE FRONT

HOUSE OF RICHARD GARLICK, ESQ., YOUNGSTOWN, OHIO

CHARLES A. PLATT, ARCHITECT



ENTRANCE HALL

MORNING ROOM

HOUSE OF RICHARD GARLICK, ESQ., YOUNGSTOWN, OHIO

CHARLES A. PLATT, ARCHITECT

SECOND FLOOR SITTING ROOM

LIBRARY

HOUSE OF RICHARD GARLICK, ESQ., YOUNGSTOWN, OHIO

CHARLES A. PLATT, ARCHITECT

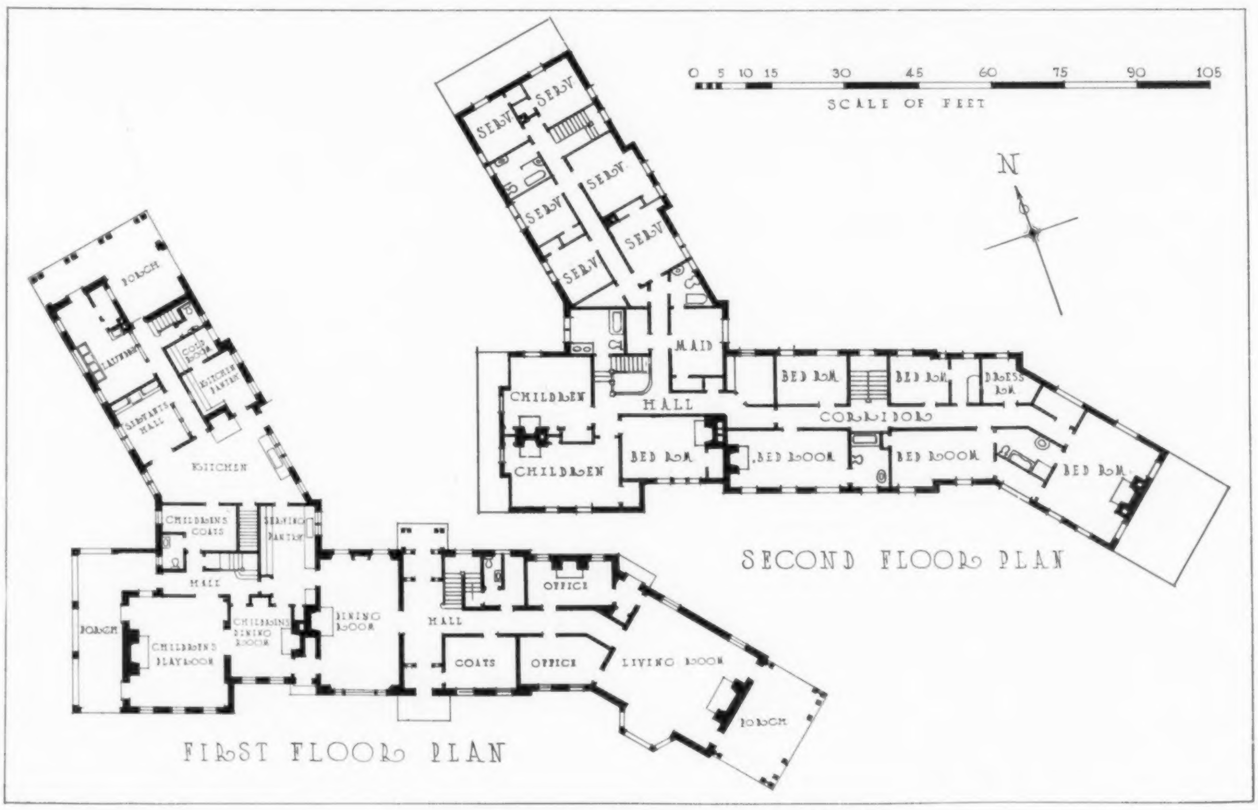
ENTRANCE FRONT AND SERVICE WING

VIEW FROM APPROACH

HOUSE NEAR MT. DESERT ISLAND, MAINE

KILHAM, HOPKINS & GREELEY, ARCHITECTS

VIEW FROM SERVICE DRIVE



HOUSE NEAR MT. DESERT ISLAND, MAINE

KILHAM, HOPKINS & GREELEY, ARCHITECTS

Villas of the Veneto

V. THE VILLA VELLUTI, AT MIRA VECCHIA, CANALE DI BRENTA

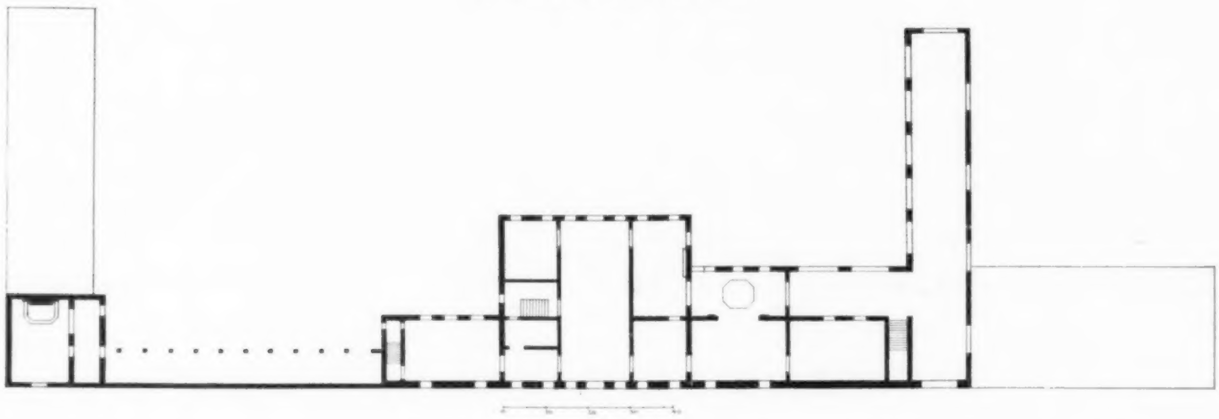
By HAROLD DONALDSON EBERLEIN *and* ROBERT B. C. M. CARRERE

THE Villa Velluti, at Mira Vecchia on the Canale di Brenta, is a typical example of the lesser villas so common all along that thoroughfare, especially between Malcontenta and Strà, and also in other parts of the adjacent region. It is of a later period than Palladio's time, and later than most of the great villas designed by his immediate successors or imitators. It dates from the eighteenth century or, perhaps, very late in the seventeenth. At one period of its history it was a shooting box belonging to the Bishops of Padua and occupied by them when they came down in the autumn with a numerous following of guests and retainers to shoot marsh fowl that abounded in the fens and on the canals. Witness, in one of the rooms, the great elevated octagonal hearth, surmounted by a funnel hood, upon which the sportsmen were wont to roast the results of their day's bag on spits over the glowing coals.

Who the architect was we do not know, nor do

Villa Velluti, Barns and House from the Garden

Elevation of Front toward Road



Floor Plan of Villa Velluti

we know many of the details of the villa's individual history which, for the most part, is unrecorded. But the house is significant as a local type and because it reflects so plainly the enduring prevalence of Palladian influences, albeit those influences appear in an unpretentious and greatly simplified or, indeed, modified form.

To understand the plan of this villa and its connection with a rather unusual environment—the same may be said of numerous other villas of which it is a representative type—one must form some mental picture of the Canale di Brenta and of the exceptional conditions that obtained along its course from the fore part of the sixteenth century, when the Venetians began to extend their zone of habitation to the mainland for a portion of the year. The Canale di Brenta is in many respects more like a street than a mere waterway. In the sixteenth century, and for hundreds of years after, the canal and the roads on each side of it formed the main artery of communication between Venice and Padua. The Venetians, with their natural predilection for water travel, found it convenient to come in their barges or gondolas to the very doors of the country houses they built along its banks. Many of these craft were exceedingly magnificent, with canopies of crimson and gold, curtains of rich silk or brocade, and the gondoliers or rowers in the gay liveries of their masters. In the seventeenth and eighteenth centuries each family had for this suburban journey a sort of light houseboat, called a *burchiello*, fitted with all possible comforts. The occupants dined or supped sumptuously on board and spent the time between whiles playing cards.

Some of the nobles would come in their barges as far as the mainland and there be met by their great coaches in which—or else upon horseback—they would complete the journey to their villas with all the splendid pomp and circumstance so dear to the Venetian temperament. This multicolored and picturesque life upon the canal and its flanking roadways, along with the flow of more prosaic traffic, reached the zenith of its activity in the eighteenth century and continued unabated until the fall of the republic.

Now all this is changed. A tramway, with becoming deliberation, transports the traveler from Fusina to Padua. The canal bears only freight boats on its surface. On the roads are no longer seen the stately equipages of the great, but in their stead a motley stream of motor cars, bicycles, two-wheeled and four-wheeled horse-, donkey- or ox-drawn vehicles of nondescript and antiquated patterns—especially on market days—and even wheelbarrows as means for the conveyance of humans, vegetables and poultry. Many of the villas have come upon evil days and are either falling to decay or are tenanted by the swarming families of *contadini*. Enough traces of the canal's former glory remain, nevertheless, to give one a fair idea of what it once was and to well repay the architect traveler.

When a bend of the canal, or some other chance occasion, deflects one or the other of the roads for a short space from the immediate banks of the stream, the villa grounds in that interval extend to the water's edge. The water steps and gates to such estates were sometimes the objects of very engaging architectural treatments and contributed an unusual element of interest to the general composition. The majority of the villas, however, like the Villa Velluti, lay directly on the road between which and the canal was an open stretch of green-

DETAIL OF FACADE TOWARD THE ROAD

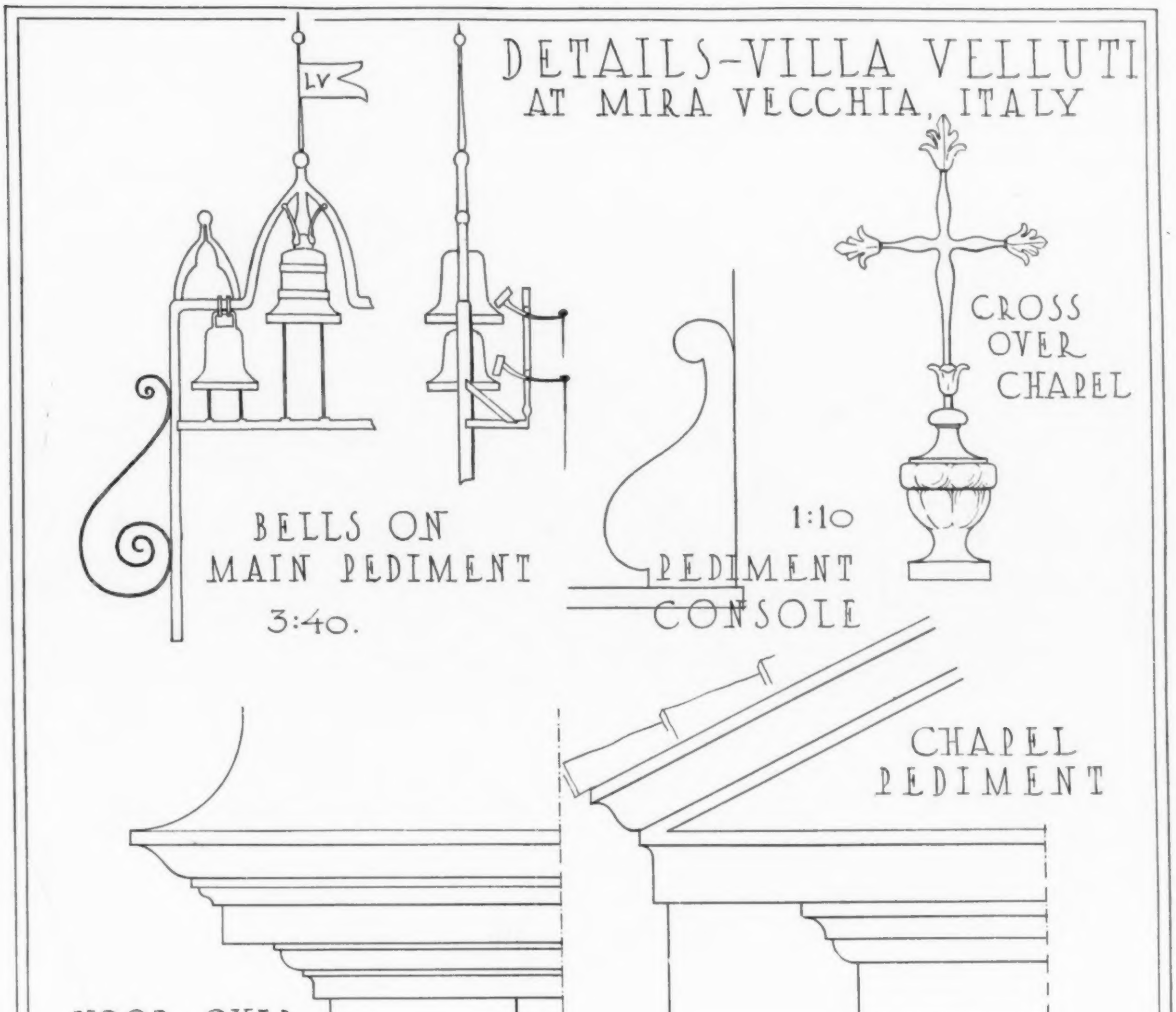
VILLA VELLUTI, MIRA VECCHIA, CANALE DI BRENTA, ITALY

Court at Junction of House and Stables

sward so that those arriving by gondola or barge crossed the grass and the road and presently entered the house without passing through courtyard or garden. As the villa habit increased among the Venetians, the land on both sides of the canal became more and more in demand for residence purposes so that eventually there were two continuous chains of country houses, facing each other from the opposite banks and separated by the width of the stream and its parallel highways.

The long established custom of placing the stables, *cantine*, granaries and other farm buildings in close proximity to the master's house, making one unbroken group of the whole assemblage, was too strongly entrenched in popular favor to be set aside merely by the advent of more and more neighbors desiring a water frontage. Besides, why should such a usage be modified or discarded? Its convenience and desirability had been approved by centuries of experience. It was an essential element in the amplitude of villa life as the Italian conceived it, and it was wholly in accord with a highly organized system of domestic economy—and had not the great Palladio sanctioned and glorified it by bestowing upon it a broader degree of "decorum" than it had pre-

Villa Velluti, Farmyard and Stables



January, 1922 The Architectural Forum

Entrance to Chapel and Part of Roadside Wall

viously possessed? Furthermore, it had the advantage of keeping the next neighbor on each side at a sufficient distance to insure one's own privacy. And so these villas displayed on the road front a length of wall calculated at a casual glance to magnify the impression of size, while in reality they were of but moderate extent. The gardens and farm lands stretched away to the rear. In one respect conditions along the canal made it generally expedient to modify one well defined scheme of Palladian layout by reversing it, and the Villa Velluti affords a good instance of such a reversal. Whereas one of Palladio's favorite types of country house plan prescribes a central block with wings returned *forward* towards the approach, here we see the central block with wings returned *backward* from the principal facade so that a straight run of wall may be exposed along the road front.

As the plans show, the actual dwelling part of the Villa Velluti is of modest proportions. To the west are the stables, granaries, *cantine* and other necessary accommodations for farming operations. To the east are the greenhouses, quarters for the farm people and, as a flanking feature and proper point of emphasis in the composition at the eastern end of the road front, the chapel, an essential adjunct invariably found either within the dwelling itself or in connection with every villa of any importance. Upon examining the plan of the master's dwelling it will be seen that the most conspicuous characteristic of the

Villa Velluti, Garden Front of Master's House

Carriage Entrance from Road

to the grounds, on the south side, with its decorous urn-topped piers and wrought iron gates, on axis with the central hall of the house, can yet be discerned something of the old garden plan. But the passion for the *giardino Inglese*, which at one time swept Italy like a pestilence, destroying much that was valuable and leaving in its stead only a small measure of what was good, conquered the masters of the Villa Velluti too. As a result there is a *boscheria* with a little brook, an obviously artificial island, wooded mounds the contrivance of which proclaims equally obvious artificiality, rustic bridges, and all the other petty deceptions in which the Italian "Capability Browns" of that age reveled.

As one would expect, the house is built of brick and covered with stucco. This sounds prosaic enough until we remember what diversities of color the Italians impart to stucco surfaces, and likewise call to mind the gradations of hue to be found in the tile roofs—brown, red, yellow, orange, and the deep greens of mosses and lichens. In this case the stucco is a distinctly pinkish gray, the sills are of white stone, and the shutters, cornices and figures are white.

arrangement is the great central hall of the ground floor, which one enters directly from the outside. The same arrangement is repeated above stairs. The staircase is not an object of any architectural effort; it is shut off from both lower and upper halls by doors and its presence is virtually suppressed. The central hall plan, with rooms opening out from each side, prevailed both in the larger Venetian town houses and in Palladio's country houses, so it is easy to see how this manner of interior disposition became so general in the later villas. No matter how far the local architects in subsequent centuries may have departed from Palladian usage, there were two particulars in which they adhered to the practice emphasized in the Palladian age—the great central hall or *sala* as the pivotal feature of the plan, and symmetry of arrangement in exterior composition.

The garden to the south of the Villa Velluti (the side away from the road) was doubtless once laid out in formal manner according to the custom obtaining throughout the region, and some traces of this erstwhile formality still remain. From the far entrance

Villa Velluti, the Stable Arcade

On its road front the Villa Velluti displays extremely little ornamental detail and what there is on the facade of the dwelling itself is of the simplest sort—a modest cornice, a fillet and fascia carried as a belt course across the face of the gable to form pediment-wise what Palladio would have called a "frontispiece," the small inverted supporting scrolls, the wrought iron belfry on the gable peak, the clock face, and the stone figures on the gable and (originally) at the corners of the parapets. A long, unbroken stretch of intervening wall to the east serves as a foil for the modest decoration of the chapel facade. To the west, the expanse of walling is more varied by the arched carriage entrance and the succession of oval windows enclosed by mouldings with *mascarons* at each side. The garden front is even more severely plain. Here, however, the eye is arrested and interested rather by the arcaded ell of the stable and barn, with the oval, cross-barred openings in the upper story. The stucco of the barn ell is the same pinkish gray as the house, while the cornice and the mouldings about the windows are white.

The Villa Velluti, more than many of the villas of the Palladian following which fill the Veneto, possesses certain qualities which should be of value to the designer today. Without possessing strict and literal symmetry the villa exhibits a well balanced appearance such as is often striven for in designing American country houses. The placing of the chapel, as shown upon the plan, at some distance from the villa proper and the screening of the connecting arcade by a brick and stuccoed wall, increase the breadth of the group of buildings and balance the long wing upon the opposite side which contains the stable and other domestic offices, a string course of brick between the windows of the upper and lower floors continuing the line established in the wing to the left by the cornice and tiled roof of the arcade between the villa and the chapel.

That the Villa Velluti possesses distinct charm one feels sure at first sight. To determine exactly wherein lies the essence of the charm, however, is a more elusive process. The ensemble of the whole group of buildings is doubtless an important contributory element; the color and sundry other items, such as that truly Palladian touch, the clerestory gables at the sides with semi-circular Roman windows, have likewise their several values to contribute; but what is, perhaps, most significant of all in any thorough analysis is the symmetrical and straightforward composition of the principal mass with its agreeable disposition of voids and solids. The dominating symmetry of the master's dwelling is quite sufficient in formal accent to invite the play of moderate dissimilarity between the two flanking members and yet maintain the measured orderliness of the entire group. Altogether, there is a felicitous union of simplicity and elegance that cannot fail to invest the Villa Velluti with a very substantial quality which merits our interest in it today.

Courtesy of Biblioteca Marciana, Venice

An Early 18th Century Print of a Villa and Garden on the Canale di Brenta, Italy, Showing a Barge Characteristic of the Period

Concrete in the Field

By WALTER W. CLIFFORD
of Clifford & Roeblad, Engineers, Boston

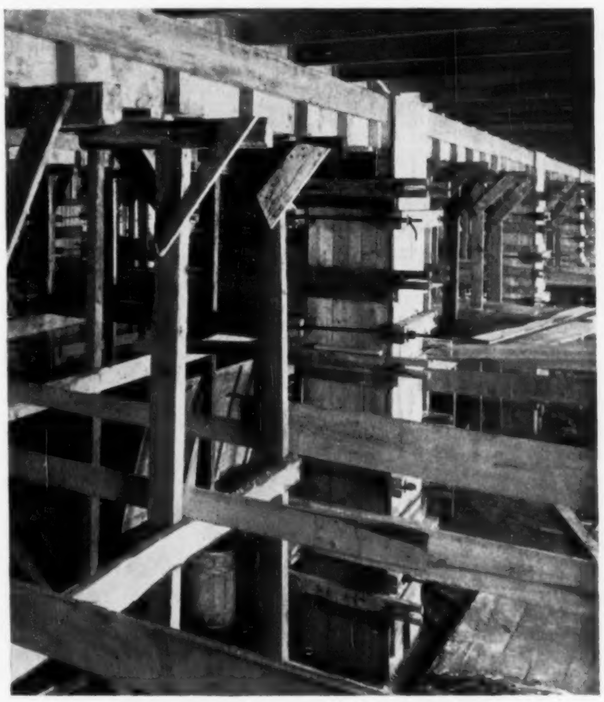
WHEN a muddy appearing, gray substance is being spread over some steel rods on a wood floor form, it requires considerable faith on the part of the layman to believe that this is to become a strong, rigid floor. Even the architect or engineer with limited field experience, who knows that the mud will change to rock, finds it easier to visualize this change in the office than in the field. The architect who is supervising by occasional visits to the site has a difficult task on concrete work, because finished appearance is a poor criterion for internal strength. The best he can do is to avoid too great regularity in his visits, and assume that what he sees in process is typical. The clerk of the works or resident inspector has an advantage, being constantly on the ground, but he has plenty to do.

The forms should first be considered in concrete construction. In a way, they are merely a contractor's problem as he is responsible for the results obtained by their use. In practice, however, it is most satisfactory to have things right from the beginning; therefore, the field inspector ought to make sure that the forms are correctly constructed. The first requirement of forms is that they be accurately built to plan dimensions. A corollary to this is that they be rigidly braced so that they will retain their sizes and shapes under the loads of wet concrete. Metal interior column forms, in particular, need careful attention to insure plumb columns. The inspector will not have time to check the strength of forms, but while pouring is in progress the forms should be watched and any evidence of serious buckling should be the signal to stop work until the form is properly braced. A frequent cause for form failure is settlement of shores under first floor forms, when they rest on fill and do not have sufficiently large sills to spread concentrated loads. This point should always be carefully checked.

Cleaning forms just before pouring is a difficult point for the inspector. He should be forehanded enough to have clean-out holes at the bases of all columns and walls. Without them it is often impossible even to see conditions at the bottom, much less to clean out the sawdust and mortar chips which are sure to accumulate in such places. Clean-out holes should be so placed that it is possible to reach in and pick up chips anywhere along the construction joint. If a compressed air or steam hose is available, clean-out holes may be 10 to 20 feet apart and the nozzle attached to a pole used to blow all rubbish to the nearest hole. Clean-out holes are not ordinarily provided in round steel column forms as used for flat slab construction. Such forms can be placed after the forms above and the joints below are cleaned out, but even then watchfulness is needed to be sure no more dirt gets in. The construction joint at the base of the column cap in this type of construction is difficult to clean without compressed air. Great care should be taken to keep this joint clean. If this is not successful, or if laitance is allowed to form, dirt and chips must be gotten out through the vertical steel and spirals by hand.

Reinforcement looks more simple on the floor than it does on drawings. Well placed reinforcing is so regular in appearance that the omission of rods is quickly noticed. The number, size and general location of rods are easily checked. The condition of the rods often needs attention. A slight film of rust is not objectionable, but any loose, scaly rust should be removed with a wire brush. It sometimes happens that rods in storage or in places near where there has been previous pouring are spattered with mortar; where this is so, they should be brushed clean, as such mortar adheres only loosely to the rods.

It is important to have the rods properly located with respect to the form surface. Metal chairs, of which there are several good types on the market, should be used. Where these cannot be afforded, small concrete blocks of the required thickness may be substituted. Under no condition should the rods be laid directly on the form and pried up to



Typical Forms for Beam and Slab Construction
Clean-out hole may be seen on right side of column base

allow a film of mortar to flow under. When this is done the location of the steel is uncertain, fireproofing may be damaged and the slab may easily be greatly weakened.

Conduits for wires and occasional short lengths of service piping wander around rather promiscuously in the concrete of a modern building and often cause trouble to the inspector. Conduits, however, as ordinarily used, need cause no difficulty. The plane of conduits should be just above the main reinforcing in slabs. This necessitates the use of outlet boxes of suitable depths, or offsetting of the conduits at the box. Shallow outlet boxes are a frequent cause of interference between conduits and steel.

Iron conduits, parallel to reinforcing, are not harmful if they are satisfactorily spaced. The ordinary small conduit encased in concrete will safely take as much compressive stress as the concrete it replaces. In tension — longitudinally — it will aid the reinforcement. In the matter of spacing, conduits parallel to the main reinforcing may be considered as additional rods. Two adjacent rods should be spaced at least twice the maximum size of the aggregate apart in the clear. Conduit paralleling reinforcing rods should be placed between them rather than directly over a rod, for in the latter case the conduit is likely to destroy the bond over half the circumference of the rod.

Conduits 1¼ inches or less, crossing the main reinforcement, have sufficient strength as supported by the concrete to transmit stress. Larger conduits should be of heavy pipe if they must be located at points of high compressive stress. Conduits crossing the main reinforcement should be at least 4 inches apart in the clear, under ordinary conditions, to insure the concrete's flowing around the crossing point and bonding with the reinforcement between conduits. Outlet or panel boxes are often placed in columns. In such cases care must be taken to see that the conduits as they turn horizontally into the box are so spaced that they do not sift out coarse aggregate, causing a pocket underneath. Where conduits are running in several directions in a panel and crossing each other it will be best to have the lower layer under the reinforcing. These conduits will come very close to the surface and it is a good idea to wind them with fine wire to prevent spalling of the mortar film from the smooth surface of the conduit.

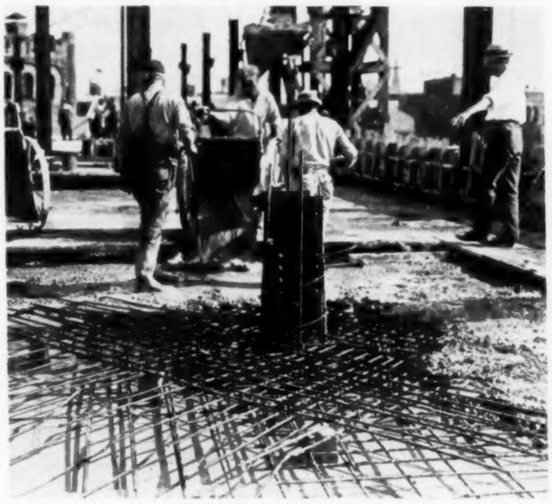
For the inspector the critical details on inserts are to see that all necessary inserts are placed, and that they are secured to the forms in a manner which will insure their remaining in place during the spading of the concrete. Some contractors prefer not to place inserts in the forms as they find it difficult to get them in the right positions and claim that it is cheaper to drill holes in the concrete afterwards and use inserts of the expansion bolt type. This is satisfactory if the loads to be supported are light and do not vibrate.

The approval of aggregates is an important duty which falls to the inspector and which requires the exercise of good, quick judgment. Specifications are sometimes indefinite on the subject, and often conditions at the work arise which could not be foreseen when the specifications were written. The maximum size of coarse aggregate is usually specified. In slabs or any other place where reinforcing bars are closely spaced, this should be rigidly adhered to, observing the relation that the maximum size of aggregate should be not greater than one-half of the clear spacing of the rods. On the other hand, in plain mass footings or walls there is almost no limit to the size of aggregate so long as the proportion of the whole mass is such that all pieces of coarse aggregate are firmly imbedded in mortar.

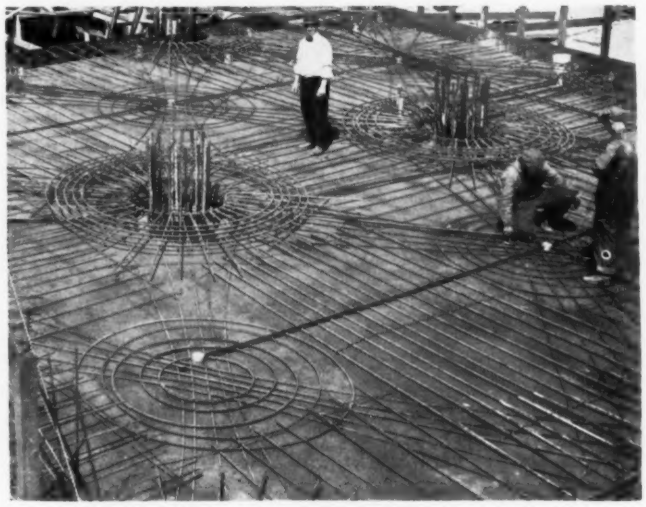
Hardness and soundness of the rock used as coarse aggregate is more important than whether it is gravel or crushed stone. Flat or finger-shaped pieces to an amount greater than 5 per cent should be excluded. Clean aggregates are essential. A film of dust, particularly on gravel, is detrimental to good concrete. Sand was for many years specified as "clean and sharp." Its cleanness is of paramount importance, but sharpness is now an obsolete requirement. Cleanness, as required for sand, is not easy to judge by inspection. 3 per cent of clay is not objectionable, but the same amount of organic matter would mean digging out the concrete and replacing it. There are various field tests given in standard text books which can be resorted to. A simple field test is to mix a small amount of 1: 2 mortar and see if it sets up hard within the proper time. On important work it is just as necessary to get laboratory tests on the sand as on the cement. Sand should be well graded, that is it should have coarse (¼-inch), medium (⅛-inch), and the fine grains (1/16-inch or less) in approximately equal proportions. A sand of which all particles will pass a No. 8 or 10 sieve, such as is used for plastering, is not good concrete sand.

Cement is measured by the bag, assuming that a bag is equivalent to 1 cubic foot. Sand and stone for hand mixing are usually measured in a bottomless box built of a size to give the required quantities for one batch. For machine mixing, aggregates are usually measured in wheel barrows or hoppers. For calibrating, a box of known content, conveniently 1 cubic foot, should be provided. With this as a measure all barrows or hoppers should be filled with the proper amount of material and paint or crayon marks made on the sides to show the proper filling depth. This process of measuring should be repeated from time to time as the markings become faint.

Barrows for measuring should not be of the flat pan type since a small difference in depth of filling, hardly noticeable, means a large error in measurement. There are various deep-bodied barrows and carts obtainable with vertical sides. All measuring barrows should be of the same type and size to avoid confusion. Two or more different mixtures are often used alternately. In varying the



Pouring Concrete from Carts



Good Example of Reinforcing Showing Conduit

Chairs show in foreground of illustration at left while in that on the right they are not yet installed

amount of aggregate, the measuring barrows should be so calibrated that one or more barrows can be omitted from the richer mix. This is more accurate and less likely to cause error than to change the filling line of the barrows.

Mixers are of many kinds. The batch or intermittent mixers are most satisfactory, owing to the difficulty of charging continuous mixers uniformly. Charging hoppers should be used on batch mixers as far as possible. They may save 80 per cent of the charging time of the mixer and reduce the temptation to skimp the time of mixing. For all reinforced work or water-tight work there should be at least one full minute of mixing from the time that the last of the materials is in the mixer until the first of the batch is dumped. It is not possible to tell from appearance whether concrete has been mixed a sufficient time or not. It will be found, however, that concrete mixed a full minute will require less water for the same consistency than concrete mixed half as long.

The consistency of concrete is most important. It is regulated by the amount of water used and the time of mixing. The desired consistency is that of a heavy paste which will of itself flow very sluggishly around the reinforcement. A batch of the proper consistency, when dumped from a barrow, will neither break nor flow readily over the edge. On the floor form, it will settle slowly but retain the shape of a mound and no water will run out. In the future, standard slump tests * for consistency will be more and more required. Having determined by trial the proper quantity of water at the beginning of a mixer run, this same amount can and should be controlled by some water-measuring device and used until conditions change. Alternate dry and wet batches made at the whim of some laborer are unsatisfactory. The first or trial batches should be put where they can be taken care of even if of poor consistency—not in a column or deep girder. One gallon of water for each cubic foot of stone is a good quantity for the trial batches.

From the mixer, concrete is dumped into a bucket and hoisted up in a tower to a hopper from which distribution is by chutes or by barrows and carts. With chute distribution of concrete the temptation to make the concrete too wet is great. Slopes varying from 1 in 6 for distances up to 50 feet to 1 in 3 for a 300-foot distribution should be the minimum slopes. Open metal troughs, about 10 inches wide, are most used and are suitable for slopes ranging from the minimum, as just given, to about a 1 in 2 slope. Open troughs should have a uniform grade or increase slightly in pitch as they get farther away from the tower; there should be no reversals in grade. Where slope greater than 1 in 2 is used, the trough should be replaced by a 5- or 6-inch sheet metal pipe. Barrows or two-wheeled carts are also commonly used to distribute concrete. They are economical on ordinary sized work and have the great advantage that a mixture of better consistency can be used with them.

Thorough cleaning of every piece of equipment used for mixing, placing or transporting concrete is essential. Mixers, chutes, barrows, hoppers and tools should always be thoroughly washed down before and after using. Caked concrete in the mixer reduces its efficiency greatly and in chutes or barrows it will clog the flow of fresh concrete and as it breaks will introduce spongy, worthless material.

The placing and spading of concrete require both skill and strength. The laborers wheeling concrete or handling the chute must be efficiently directed, and in addition some shoveling as well as spading must be done to get all the concrete in place. Footings and walls are placed in layers 6 to 12 inches deep. The sections should be small enough so that not more than half an hour will elapse between the placing of separate layers at any point. Columns should be poured their full height at one time and are usually allowed to get their shrinkage (half an hour is sufficient in summer weather) before

* See "Tentative Specification for Workability of Concrete for Concrete Pavements," Am. Soc. Test. Mat., D62—20T.

the floor is poured. Slabs are poured their full thickness progressively along the floor, filling the beam forms at the same time. Temporary screeds are set to give grade and the surface is struck off to grade as it is poured. Without special attention the slabs near upstanding spandrels will come up from the weight of concrete in the beam. This necessitates expensive picking to get it down to grade for finish. Rough slabs which are to have granolithic finish can be roughened up most economically with a short-tooth garden rake as soon as the concrete has had its initial set.

Spading along the face of the form used to be considered necessary, but it has been found that spading in the middle of the beams will give just as good a surface. A sufficient amount of any spading, rodding or joggling will answer all necessary purposes. The main reason for spading is to liberate entrained air and prevent pockets by joggling the mass so that the cement and sand will have a chance to flow around all coarse aggregate and all reinforcing. A secondary function, important in many cases, is that of insuring a film of cement between the form and any aggregate so that the surface will present an even texture without voids or honeycomb when the forms are removed. From three to five men are needed to place and spade the output of a ¾-yard mixer.

Location of construction joints is left to the inspector's judgment. Beams and slabs are stopped against vertical bulkheads in the middle of simple spans. These bulkheads usually have to be notched over the reinforcement. Girders with a single beam framing in the center should be stopped at about the third point. Beams and slabs should always have vertical joints, never allowing the material to stop at its angle of repose. Horizontal joints should be so located that they can be cleaned before the pouring is resumed. Where this is not possible, as in the joint in a flat slab column at the base of the capital, all laitance should be chipped off down to clean aggregate before pouring again.

For laitance—the greasy scum which accumulates on over-wet concrete to the depth of an inch in bad cases—contains much valuable cement but has no load-carrying capacity. Horizontal construction joints should be indented with pieces of 2 x 3 or 2 x 4 wood, placed in the fresh concrete to form a key.

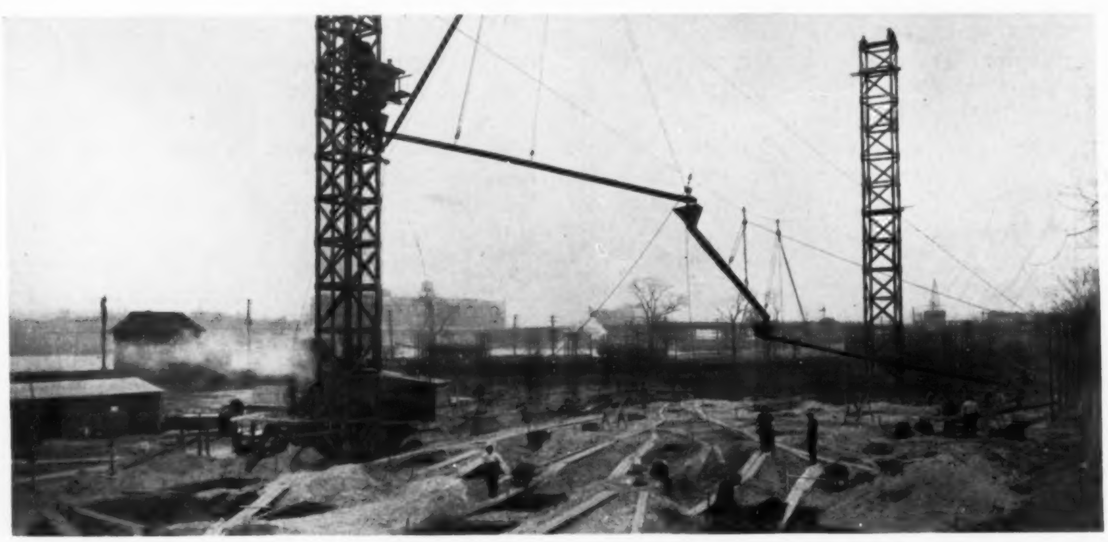
The time of form removal may well be left to the contractor, if he be a man of known skill. The time varies greatly according to weather conditions, from 24 hours for walls in good summer weather to several weeks for beams and slabs in cold weather.

Floor forms should not, of course, be stripped until the floors above are poured and preferably not until the second floor above is poured, to avoid the possibility of a fire in the upper forms dumping concrete on a young slab.

Frozen concrete is the usual excuse for premature form removal. Frozen concrete will ring from a hammer blow like well set concrete, but a little boiling water will quickly show the difference. Forms for mouldings or other ornamental work should be left as long as possible. The harder the concrete the less likely are the corners to chip.

Voids or stone pockets, which show upon removal of the forms, should be patched as soon as possible after examination has shown that the fault is not dangerous. When all precautions are taken, however, a little patching is usually necessary on the best of jobs—it is not necessary, however, to admit this to the contractor.

But all this knowledge without common sense is nothing worth. Good common sense and practical experience are necessary in order to make intelligently the exceptions to which every rule is subject. And, after all, satisfactory concrete work can only be obtained by selecting a capable contractor and adopting co-operation in dealing with him.



Pouring Concrete Footings by Towers and Chutes

BUSINESS & FINANCE

C. Stanley Taylor, *Associate Editor*

Straight Talks to Architects

V. WHAT IS YOUR METHOD OF CHARGING FOR PROFESSIONAL SERVICES?

IF there is any question calling for frank, open discussion by the architectural profession today it is that of methods of charging for professional services. It would seem that there are very few architects entirely satisfied with the fees received for their work and the methods by which they are paid. There are times when injustice is done to the client, but in most instances it is the architect who suffers.

The sale of direct valuable professional service constitutes a sound business proposition. Methods of charging for such service should, therefore, meet the requirements of sound business judgment. During the past few months we have had an opportunity of discussing this subject with a number of architects in various sections of the country. Naturally, wide divergence of opinion and practice has been found, but all methods tend toward similar objectives. It will, therefore, simplify this discussion to outline some of these objectives and to develop different methods which are employed toward their attainment.

Any method of charging for professional service is unsuccessful if it does not insure these results:

1. Payment for service which represents a fair profit to the architect, in accordance with the value of his services.
2. That this payment shall represent to the owner a charge against the cost of his building which is offset by the increase of intrinsic value directly resulting from services rendered by the architect.
3. That the architect shall be regularly reimbursed for the expenditures which he makes during the course of work done for a client, and that he shall regularly receive a fair proportion of his profit.
4. That the profit which the architect receives shall be commensurate with his skill.
5. That no project in the architect's office shall be the result of unfair and unethical competition with another architect on a basis of professional charges.
6. That the architect shall do no work without payment or make any expenditure on a client's project for which he is not reimbursed, unless he deliberately chooses to speculate on future possibilities of bringing profitable work into his office.

Considering these points in their order of presentation, the first objective should be to make certain that the method of payment for architectural service shall be fair to both parties. Also, that in developing the amount of this payment, the elements of guesswork and gambling on profits should be eliminated as far as possible. The method of reimbursing an architect for his work generally employed today is, of course, that of a flat percentage of the cost of the building to cover the cost of the architect's work and his profit. If all building problems involved a similar amount of architectural work, the percentage method would be a simple solution to the problem of charging for service. The fact remains, however, that there is a wide divergence, not only of draftsmen's time required but of requirements which affect the time the architect himself spends in connection with the work, including conferences with the owner and studying the owner's problem in order to produce a building efficient for his purpose. The usual method employed today is an attempt to set the percentage charge in accordance with these requirements. Thus in the designing of an industrial building or an office structure where every floor is the same, it is sometimes the case that an architect can work on a profitable basis for as low as 3 per cent. In the case of better class residential work, 10 per cent will sometimes scarcely reimburse the architect for his expenditure of time and money in satisfying a client.

Charges Governed by Work Performed

It is indeed quite apparent that in the design of most types of buildings, a straight percentage method of charging is not sound even though a definite attempt is made to set the percentage according to the estimated amount of work involved. When the architect places a percentage charge as a gross return for complete services, it is evident that he is to all practical purposes fixing a lump sum for his work, a sum under which he stands to gain or lose in accordance with the disposition of the client and the success of his own guesswork as to the ultimate cost of the work to him. Admitting that the percentage method of charging, on a basis of past experience, shows the architect a profit for the work he has done at the end of the year, it is still a fact that this profit has varied

considerably on individual projects and that in some instances the architect has actually worked for little or no profit, while in other instances the owner may have paid more than should be required for the work which has been done. In other words, the percentage method of charging is often one of loose averages and as such cannot be sound.

The best method for charging should be so arranged that it will include reimbursement to the architect for all his costs, including the proper proportion of overhead together with a fair net profit. From the owner's viewpoint, the payment which he makes to the architect should constitute a real investment which provides him with a building having greater utility, æsthetic or real estate value, because of the services which he has received from the architect. The desire on the part of an owner to insure a high order of design in any type of building constitutes today only one of the actuating motives in the selection of an architect. The owner seeks also practical planning and equipment which will make the building a more efficient machine for its purpose. He seeks also service, which includes a knowledge of construction methods to insure the carrying out of this project on a basis of economy, representing the lowest possible initial investment. For this complete service he pays the architect; and the architect's return should be fairly in accord with his ability to meet these requirements on the part of the owner.

It is because of this condition of demand which is developing on the part of the building public, that we are entering into a period of specialization in many architectural offices. It is for this reason that, without the sacrifice of good design, the architect must appreciate the financial and business requirements of a project and must maintain a thorough knowledge of structural methods to aid in keeping down capital investment in building construction.

The next problem involves the question of the payment of the architect's expenses and fees. In the average arrangement, made between an architect and his client, the architect is called upon to finance much of the work during the planning stages. In many instances his profit on the work which he does is not realized until the building is actually under construction and often until the building is actually finished. This fact has worked hardship on many architects, particularly in connection with large projects where considerable sums of money are required to pay drafting, overhead and general expenses. It is not fair that the architect should be called upon to bear this burden nor that he should have funds tied up indefinitely in plans which await the owner's pleasure before entering the stage of actual construction. Regardless of the method of charging, arrangements should be made by which the architect is reimbursed at least monthly for his expenses and is paid some profit on the work done.

The Money Value of Professional Skill

We have set forth as one of the requirements of a sound basis of charges for professional service that architects' profits should be commensurate with their relative skill and experience. We realize that this is opening up a subject which has many complications because there is a definite question of the value of individual service in this consideration.

In every known profession skill and experience carry their premium. In the medical profession, the specialist receives a higher rate for his time than the average practitioner. In the legal profession, able and experienced attorneys who have developed reputations along specialized lines or in general practice can and do command larger retainers than those who have not demonstrated this skill and capacity for rendering valuable legal service. In the architectural profession an attempt is often made to standardize fees regardless of the complexity of the building project involved, or the architect's ability to render real service. If a prospective building investor should ask almost any young architect as to his ability to design a building of any nature, he would receive a positive and optimistic reply that no one could serve him better. This is not a fact, excepting perhaps in the designing of moderate cost buildings where the requirements of architectural service might be comparatively simple. Otherwise, there will usually be a considerable difference in the quality and value of service — a difference which represents the relative ratio of experience and skill. This very fact explodes the theory of standard charges for architectural service. The building public recognizes this difference and pays to the young and unknown architect $100 or less for the complete plans and specifications of a moderate cost residence, but will pay 10 per cent and many extras to the architect who has a record of unusually good service. How is the young architect to get this record of good service if he cannot work at a low rate until he has demonstrated his skill and can logically charge more for his services? There is certainly a misconception of ethics in any statement or any attempted regulation which would impose a charge of unprofessional conduct or which erects an artificial barrier against this natural course through which an individual progresses to an important position in his chosen profession.

At this point there must also be brought into the discussion the question of competing for work on a basis of professional charges. Section 11 of the Canon of Ethics of the American Institute of Architects says definitely that it is unprofessional for architects to compete *knowingly* for employment on the basis of professional charges. From the ethical viewpoint this is a sound principle but it does not define the term, "to compete knowingly." It would, of course, be not only unethical but unbusinesslike for an architect knowingly to seek the

favor of an owner by offering to do work for a smaller fee than that which he knows another architect has already proposed. On the other hand, if we admit that the services of one architect are worth more than the services of another, because of the elements of skill and experience, it is evident that the architect with lesser experience should be able to work for a smaller fee on the same project without violating professional ethics. This, of course, assumes that the client knows by general reputation or otherwise that the less expensive service is inferior and that the architect admits this fact. In spite of any artificial standard of charges which architects may set up, the public in one way or another will pay in accordance with skill and experience. As a rule, the buyer of architectural service will seek this service in accordance with his requirements. If they are not complex, the owner will seek the services of an architect whom he believes capable of doing the work and who will do it at what he is pleased to term a "reasonable cost" — a price which would be less than cost with its attendant overhead. On the other hand, if the problem is complex in nature, the owner will seek the services of an experienced architect because he realizes that although he might have the work done more cheaply by an architect of less experience, the investment in the service of a specialist is logical if the operation is difficult. At this point we reach the problem of ethics between the more experienced organizations, and here we are frankly at a loss to know where to suggest limitations. This much, however, is apparent in our opinion — that an owner has a perfect right to take his problem to the office of an architect whom he believes capable of carrying out the work and to ask him on what basis of professional charges he is willing to develop the necessary plans and specifications and to give requisite supervision. If he then goes to another architect of equal standing and requests the same information, to be considered coevally with the first, it does not seem to us unethical for the second architect to refuse to do business with him.

Ethics and Architects' Charge Systems

It would be shortsighted to deliberately cut prices. If an architect is flatly asked by an owner to do work for a price less than that quoted to him by another architect, and if he is aware of this price, there is but one ethical and businesslike course, which is to turn down the proposal. On the other hand, even if he knows that another architect is receiving consideration and has also been asked to make suggestions and to quote his price for doing the work, there seems to be no reason why he should not quote a figure which represents a satisfactory profit to him. If we consider the two offices in question, we may find that because of the greater knowledge of the cost of doing work or because of several other conditions which may affect the situation, including perhaps a more careful consideration of repetitious work, the cost of architectural services given to the owner by the second office may be less than would be received from the first office. The selection would then be a matter of judgment on the owner's part as to the value of services which he may expect to receive from the individual offices. From the architect's viewpoint, this is not competing on a basis of professional fees, but is giving a quotation of price for service on the basis of production ability, which, after all, is the only sound basis of competition throughout all business and professional activities.

This condition applies particularly to commercial and industrial work, where the efficiency of the building as a machine designed for a specific purpose and its value as an investment are of paramount importance. In certain classes of institutional and residential work the element of design is of particular importance and selection of architects will usually be made on a more directly personal basis. Consequently, we find a condition developing today through which even many of the larger offices are taking work on any reputable business basis which represents a profit to them and a payment for the time of principals which they believe equals their own valuation. Similarly, we find that in spite of any standards which may have been set forth, the young architect is working for a price to the owner, which to him represents the profit which he is willing to take for his services and in consideration of his lower overhead costs.

In the foregoing paragraphs, we have outlined definite objectives toward which the fixation of methods of charging for architectural service should be directed. The next logical consideration is an examination of present-day methods of charging for professional service in order to determine the strength and weakness of various systems and to establish grounds upon which the ideal method of charging for service may be determined.

The detailed information furnished by the American Institute of Architects on this subject, together with some of the more interesting methods of charging developed by individual offices, will be considered in the second section of this article which will appear in the February, 1922, issue of THE ARCHITECTURAL FORUM. In the second part of this article there will also appear the various conclusions which have been drawn as a result of a careful survey of this field and such practical recommendations as may have been developed through a consideration of the methods employed by various architects. Before entering into this detailed consideration, however, it will be of value to outline briefly a number of the methods through which architects are receiving compensation today. There are, of course, the three methods more or less in common use: the straight percentage and the fee-plus-cost methods, both of which are recommended by the American Institute of Architects, and the salary method, a variation of the fee-plus-cost system, each of which has its advantages.

In the application of the straight percentage method, various means are employed to develop what might seem to be a fair fee. In the case of a building where there is a considerable amount of repetitious work, such as a number of floors having practically the same layout, it is the practice of some architects to deduct from the total cubic footage of the building that number of cubic feet which represent repetitious work in planning and thus arrive at an estimated cost much lower than the actual cost of the building on which the percentage fee may be applied. Others take into consideration the fact that there is repetitious work and reduce the percentage of the fee accordingly. It is quite often the case that architects quote lump sums covering the entire work involved in the planning of a given project. In effect, these architects become sub-contractors sometimes, and perhaps unknowingly, bidding for the architectural work and establishing their price on a lump sum basis which, because of the nature of the work, is often a greater gamble than that taken by the material and labor sub-contractor who bids on the actual construction. It is evident that an architect can make a lump sum proposal for his services in designing a small building when he expects to do all the work himself and considers this money as actual income for the time he may spend on the work. This is done very extensively in the speculative building field, particularly for moderate cost houses and for speculative apartment houses for which the owner wants nothing but an elevation, floor plans and a building permit. Certainly in a more complex project, when the architect maintains an organization, this form of lump sum bidding or bidding on a low flat percentage basis is often a cause for grief.

A well known architect told us not many days ago that in earlier stages of his career he tried the lump sum method of fixing a fee for his work. On a large office building project he quoted a flat sum of $25,000 to do all necessary architectural work, including supervision. The owners agreed to this price and then proceeded to make so many changes and to exert such a pressure of demand for his service and that of his organization that by the time his work was three-quarters finished, he had used up in actual expense all of the money which was to be paid for the work. In this dilemma, he went to the owners and told them the story, showing them as best he could a record of office costs. He was very fortunate in the type of people he had to deal with. They recognized the justice of his viewpoint and appropriated an additional $10,000 for the architectural work. This amount saw him through, but with a very small profit and one which was almost negligible considering the amount of his personal time given to the work. The terms of his contract were such that the owners could have forced him to go through on the original proposal, and probably three out of four owners would have insisted on this. Many other architects have had equally unfortunate experiences and have depended upon other commissions which were more profitable to bring up the average, annual earnings of the year.

Variations of the Cost-Plus Method

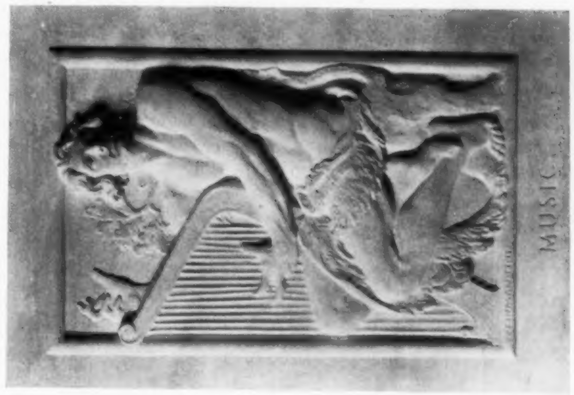
Several forms of cost-plus contracts as between architects and owners have been developed and put into operation. Among these may be noted the cost-plus-fixed-fee basis on which all costs of the work in the architect's office are paid by the owner and a small net percentage of the cost of the building is given to him for profit. Among forms which the cost-plus contract may take are:

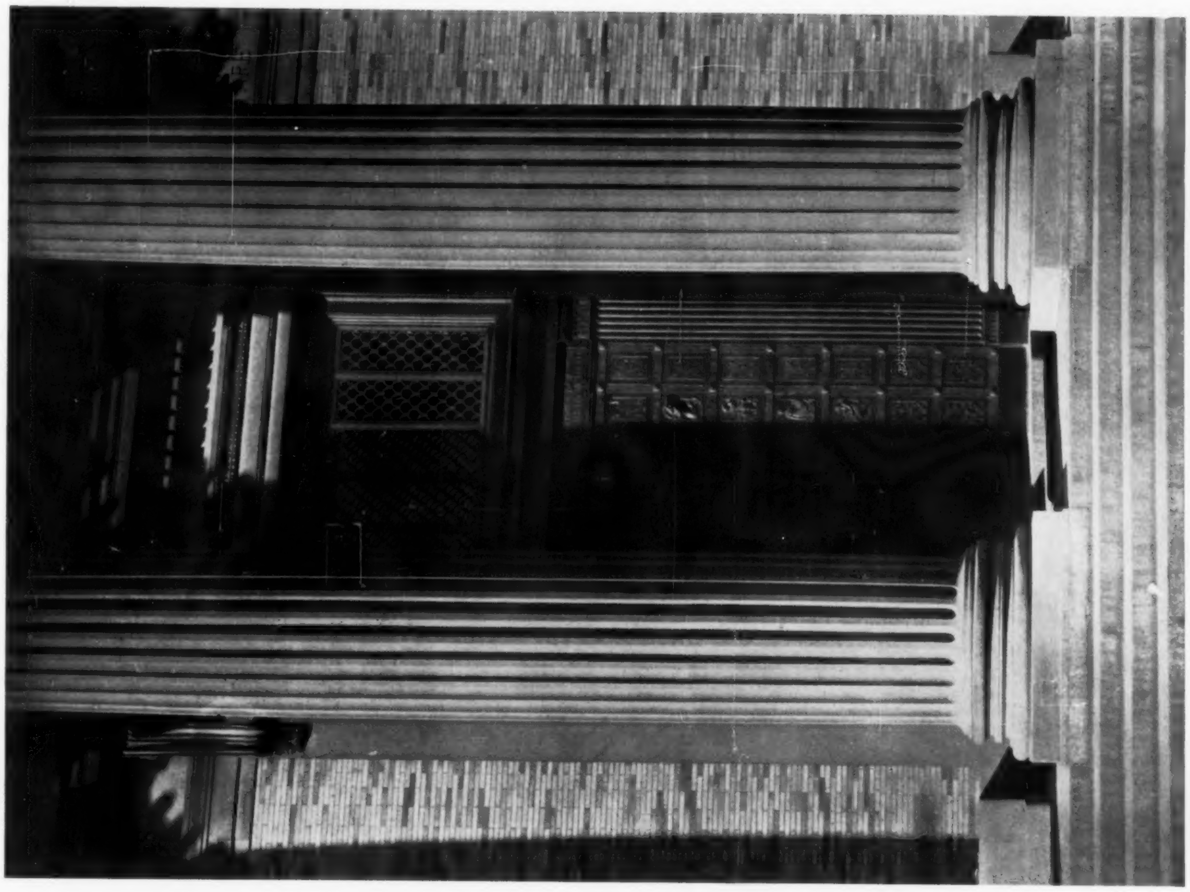
1. The contract by which the owner pays the architect his drafting cost, doubled to meet overhead, and a percentage of the total amount of this entire cost taken as profit.
2. The contract which calls for double drafting expenses to cover overhead, plus a monthly salary to the principal or principals over the estimated period covered by the designing and construction of the building.
3. The contract which calls for the payment of actual cost by the owner with the daily or hourly rate for principal's time which is spent on the work.
4. There are several other variations of the cost-plus method, including one interesting example which has come to our attention, wherein one room of the architect's office was set aside for a definite project. A rental was charged for this room during the planning period, together with salaries of an estimator, three draftsmen and a stenographer. Payment was made for principal's time at conferences as called upon by the owner and a lump sum was set aside as his profit.

It will be seen that there are numerous variations of the cost-plus method of rendering architectural service. These all have certain definite value, however, as opposed to the percentage method, particularly in that it is possible to render a monthly accounting to the owner and to be reimbursed at stated periods for all costs; that the owner pays only for the amount of work which he wants; that at any time, if the project is abandoned, the architect has actually been paid all the cost of the work to him, together with some profit and has not been forced to tie up his own money, awaiting future reimbursement.

The details of some of these methods, together with logical conclusions which may be drawn from the facts which are here presented, will prove of definite interest to many architects who may wish to revise their own financial relations with clients. In the February issue of The Forum, therefore, this detailed consideration will be given. Meanwhile, we shall be glad to receive correspondence from architects who have opinions to express on this subject or who may have had experiences, the knowledge of which will be of benefit.

STANFORD WHITE MEMORIAL DOORS, LIBRARY OF NEW YORK UNIVERSITY, NEW YORK
LAWRENCE GRANT WHITE, ARCHITECT





GENERAL VIEW AND DETAILS OF SCULPTURE

STANFORD WHITE MEMORIAL DOORS, LIBRARY OF NEW YORK UNIVERSITY, NEW YORK

LAWRENCE GRANT WHITE, ARCHITECT

Plate Description

BANKING QUARTERS FOR NEW YORK TRUST COMPANY, New York. PLATES 1–3.

This bank occupies space in the American Surety Building, recently remodeled and enlarged. The basement, first, second and third floors, and parts of the sub-basement, the fourth and fifth floors, are utilized for the bank quarters, the different departments to which the public has access being grouped about the main banking room. To afford suitable height for this room the architects, Walker & Gillette, removed portions of the second floor which gave opportunity for a lofty ceiling and yet made possible the connecting of the second floor departments to the general plan.

The use of color which characterizes this large banking room marks a departure from the usual treatment of such rooms. Here the walls are formed of piers and arches made of Rosato marble, of pinkish color, quarried near Verona, Italy, with the openings defined by pilasters which, together with the soffits beneath the beams that carry the second floor across the arches, are of Blue Belge marble. The faces of these beams are ornamented with reproductions of American coins, from the "pine tree shilling" to the "buffalo nickel."

The elaborately modeled plaster ceiling, painted in bleached wood tones and slightly gilded, is supported by four columns, 30 feet high, in the center of the room, each made up of three blocks of reddish purple Levanto mottled marble and having a bronze renaissance capital. The floor pavement has a Blue Belge border and a field of alternating squares of Levanto and Tinos green marbles, separated by bands of Blue Belge. Metal work, such as screens and grilles, is of wrought iron, made after the early Italian manner and slightly oiled. The officers' platform and offices have a wainscoting of Italian walnut, 7 feet 6 inches high, which gives to their quarters the appearance of a library. The necessary vaults are placed in the basement and sub-basement.

STANFORD WHITE MEMORIAL DOORS, New York University, New York. PLATES 13, 14.

There have recently been unveiled at the library of New York University a pair of bronze entrance doors, given by a group of his friends as a memorial to the late Stanford White.

Few instances are known in which so many individuals have entered into collaboration, the models for the panels of bronze being given by various sculptors who had worked with Mr. White on numerous projects. The two upper figures, typifying "Inspiration" and "Generosity," are by Andrew O'Connor. They are winged, and in higher relief than the others, in order to obtain an accent of shadow. The next two lower panels, representing "Architecture" and "Decoration," the two principal activities of Stanford White's career, are by Philip Martiny. Below these are "Painting" and "Sculpture," by Herbert Adams, and "Music" and "Drama," by A. A. Weinman, these panels typifying the allied arts in which he took an especial interest. The lions' heads are the work of Ulysses Ricci, and the inscription was modeled by Janet Scudder.

These doors, which were designed by Lawrence Grant White, of McKim, Mead & White, show a departure from the usual modern practice of casting each door in a single piece. They are, instead, built up of plates of bronze, each panel, stile and rail being cast in a separate piece. The rosettes are structurally significant, as they form the heads to the bolts which fasten the bronze to the wooden doors. This is the method used in the construction of many of the mediæval doors.

Detail of Wrought Iron Counter Screen

Banking Rooms, New York Trust Company, New York

Walker & Gillette, Architects

EDITORIAL COMMENT

THE NEED FOR CRAFT REVIVAL

NOTWITHSTANDING present widespread unemployment, there exists in the building trades the ridiculously paradoxical situation that in many of the country's important cities there is a serious shortage of plasterers, which enables those available to demand and receive in some cases as much as $18 per day. In paying this no one expects to receive equivalent value in work; he is the victim of the manipulation of the law of supply and demand to serve selfish ends. It is a warning of the end of productive building and the choking of architecture as an art unless these pernicious practices of basing everything on the dollar, which are quite as evident in modern business as in the labor unions, are promptly stopped. Curtailed production, which creates artificial scarcity, will enrich a few manufacturers in industry. The same principle in the labor unions—restricting the number of apprentices—will insure short hours, easy work and high pay for the favored few.

But what is it building? Chaos and disorganization, compared with which our past troubles will seem small. This state of affairs cannot last because it is unnatural, but if the shortsightedness of leaders makes them insist on standing in the way of readjustment to reasonable premises, no small amount of general suffering will be experienced. Not content with creating a temporary financial advantage for their members, the unions have encouraged and followed a policy of putting a premium on general inefficiency that has brought the standards of craftsmanship to a state low indeed. Simple, routine methods, regarded as matters of intuition some years ago, seem to be unknown to the present generation of workmen, and this adds largely to the responsibility of the architect who, in person or through his assistants, must now supervise the simplest details of building construction. That so small a number of plasterers are to be had is due to the restrictive regulations regarding apprentices which have been kept in force by plasterers' unions, while the poor quality of work is due partly to lack of training and partly to the pernicious system which teaches a workman to carefully conceal any particular ability he may possess and to produce as little work as possible—only as much as is necessary to insure employment, which, to be sure, is practically guaranteed by his union.

And yet architecture, more than most of the arts, is absolutely dependent for its life upon the intelligent co-operation of a trained body of craftsmen, artisans and workmen with the architect himself. If all initiative and pride in work well done are to be strangled through following ruinous economic policies, and financial costs are to remain so high that expenditure in artistic effort cannot be afforded, architecture will surely perish. The movement has fortunately not gone so far that it cannot be stopped. Architects in visiting their work under construction occasionally come in contact with individual workmen and are surprised to find that often beneath the dull, lethargic attitude which is one result of the union's dominance, there still live and struggle for expression the pride in achievement and at least something of the ability which characterized the well trained workmen a generation ago. Work occupies a large part in any man's existence, and if he cannot find enjoyment in it and will make no effort to do so, he can surely expect to find but little happiness.

We have sometimes wondered if a revival of interest in craftsmanship and an advance toward higher ideals might not be led by architects themselves. There is excellent reason why their influence might be powerful in stimulating the numerous crafts and trades upon which architecture so largely depends. Architects have always maintained a studied aloofness from the turmoil which rends the building field, and this neutrality might now serve as a fulcrum from which a friendly pressure might be exerted. Whether they will or not, architects will sooner or later be forced into a position where they must take an active interest in this absorbing question. Before they can render intelligent and impartial service, and the lack of that is all that stands in the way of an amicable settlement, architects must, however, study the subject in all its ramifications. At present labor and capital are ranged in hostile camps and there is no intermediary capable of impartially analyzing their just claims.

It is not for us to suggest the means by which real craftsmanship can be revived; it is rather our purpose to emphasize the seriousness that the matter of training possesses for the progress of architecture. Whether the present workers in the unions must be abandoned and a new group of men, trained along more intelligent lines, be formed is something that only careful consideration could determine. The chief point, however, is that architects must recognize the trust reposed in them to preserve the glorious traditions of architecture and further its development in our own day. Architects know the difficulties under which they are required to work; they know what is necessary to correct present wrong conditions, and it is certainly their duty to take an active interest and see that their suggestions and advice are used, as far as it is in their power to have them used.

DECORATION
and
FURNITURE

A DEPARTMENT
DEVOTED TO THE VARIED
PROFESSIONAL & DESIGN INTERESTS
WITH SPECIAL REFERENCE TO
AVAILABLE MATERIALS

It will be the purpose in this Department to illustrate, as far as practicable, modern interiors furnished with articles obtainable in the markets, and the Editors will be pleased to advise interestea readers the sources from which such material may be obtained

Chippendale Style Chair against Background of Pilasters and Paneling in Good Scale Relation

Portion of Side Wall of Drawing Room in Eighteenth Century English Style Showing Good Scale Relation between Architecture and Furniture

Scale of reproductions, ½ inch equals 1 foot

Francis H. Bacon & Co., Decorators

Adam Chair in Black and Gold Lacquer against Larger Scaled Background, Appropriate Because of Its Light Tone

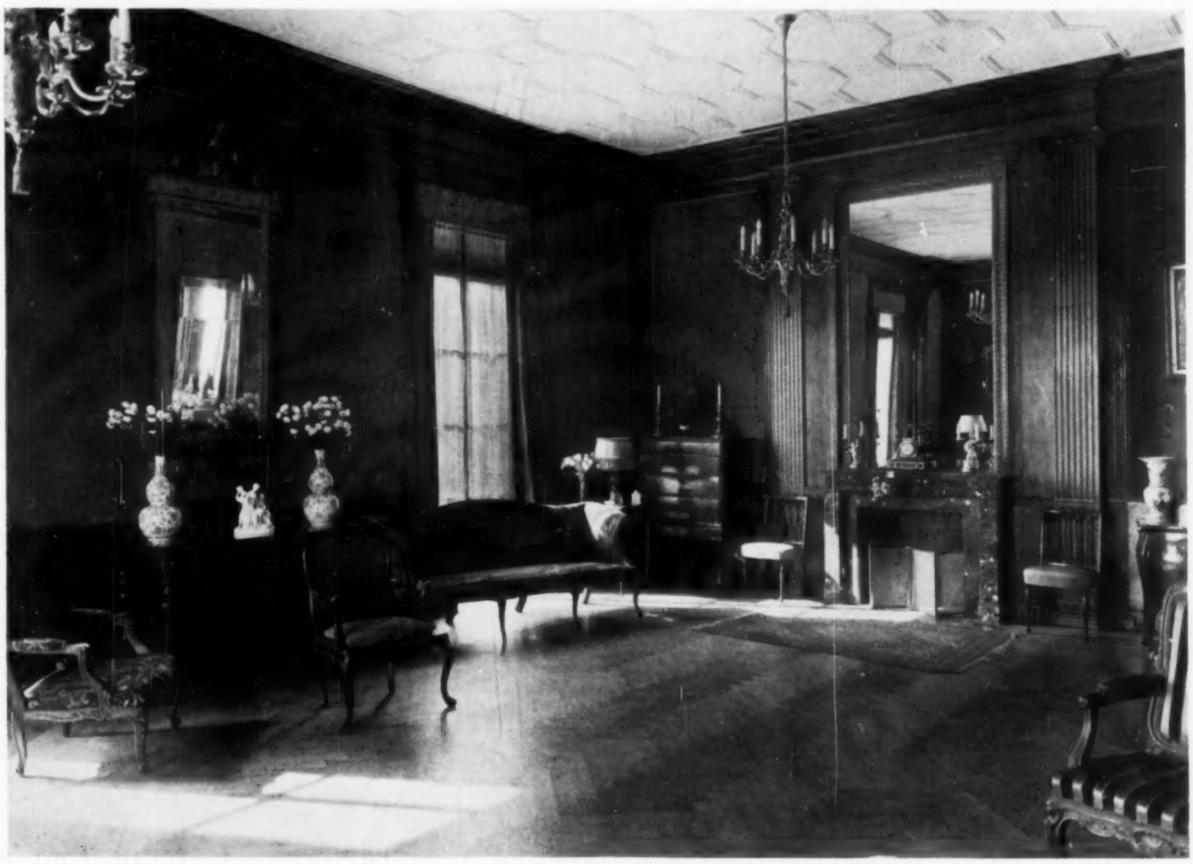
Scale in Interior Architecture

By JOHN T. SIMPSON

PROPORTION is the relation between the different parts of a composition; scale is the relation between the sizes of all these parts and an imaginary unit of measure which is determined by our sense of the fitness of things." In these words Thomas Hastings has defined two of the most vital principles which govern good designing. A study of these definitions and of their practical application will explain why violation of simple precepts, grown out of usage and good taste, results in so many failures in architecture.

Architecture is so fundamentally dependent upon good proportion and appropriate scale that if these are provided in a design, beauty can be definitely expected even though details are left to take care of themselves. Proportion and scale have a close relation but they are essentially different things. The distinction is not obvious and confusion between the two may easily be made. A motif may have good proportions and be out of scale with its setting, but if a part of the motif be too large or too small it is both out of scale and out of proportion. Correct sense of scale is a subtle quality that can be grasped only through a complete knowledge of architectural styles and a keen, almost inherent, sense of the fitness of things. It is something intuitively sensed by the well trained architect, but in common with other results of intuition is difficult to describe.

Scale may be referred to as the quality of a composition which enables us, irrespective of its actual size, to suggest dimensions for it. This practical application of scale is daily utilized unconsciously by architect and layman alike. We readily appreciate large scale or small scale in a facade, because in our streets we have people and objects with which we associate standard sizes, and these we unconsciously use as units of measurement in viewing the building. The human figure is the normal unit of measure in determining scale. This is entirely reasonable because architecture was created by and for the use of man. The rise and run of stairs are adjusted to the human step; chairs and tables are made of certain heights for comfortable use; these sizes are recognized as correct from a utilitarian standpoint and because things fully meeting practical requirements are also generally artistic, we know they are right from an æsthetic angle, and we



Drawing Room in President's House, Columbia University, New York

A room in classic style with excellent proportions and relation in scale between architecture and furniture

McKim, Mead & White, Architects

refer to them as being in scale. Other details such as cornices, windows, doors, mantels, etc., are not fixed in size by utilitarian considerations, but the architect through his training is able to make them of such sizes that they appear reasonable to us in comparison with articles of definite sizes fixed by utility. A building or an interior is, therefore, most perfect in scale when it exhibits a natural relation in the sizes of its parts to the human figure.

Large scale is often purposely used and with good effect in exterior design to give prominence to a facade in comparison with surrounding buildings. If, however, the same building were to stand alone on a level space its imposing character would largely be lost because visual comparison of the sizes of the parts with the whole would instinctively make the building appear to us smaller than its actual size. From the standpoint of exterior design, the qualities of scale are quite generally understood. It may be said that with exteriors on the whole it is better to err on the side of large scale because small scale, even though it has the effect of increasing the apparent size of the mass, robs the detail of the vigor necessary for holding it in proper balance.

When we come to consider scale for interior architecture we have to adopt different standards, and it is in not sufficiently recognizing this distinction that so many architects produce interiors of lesser merit than their exteriors. Too frequently the interiors are spoiled by too large a scale. Here we have enclosed space, not in association with trolley cars, cabs and other street objects but with articles of furniture and intimate domestic life. This essential difference must be recognized, and for an interior to be successful a proper relation of scale must be maintained between furniture and architectural background. Much of the poor scale that is evident in our interior architecture is due largely to the forcing of motifs of other periods into modern rooms of comparatively lesser size and height. We are trying to adapt to modern requirements architectural compositions that were designed for great baronial halls, and is it any wonder that our rooms are crowded, restless and exhibit a constant struggle for dominance between furnishings and setting? In the average domestic interior half the architecture could be eliminated and the resulting gain would be immediately apparent.

The Angel Room, Quenby Hall, Leicestershire, England (1620)
Excellent scale relation between paneling and furniture

If in our search for pleasing architectural motifs in the past periods of architecture we devote our energy to studying the basic principles of proportion and scale that these rooms exhibit and forget about trying to reproduce a miniature model of whatever strikes our fancy, we will be on the right road to an interior architecture that will compare favorably with the best of the old work. The work produced by the great architects of England and France in the eighteenth century, if studied for its underlying principles, provides a wonderful source of information for the modern architect. Here he will find rooms of great proportions and vertical emphasis given by height of ceilings, but withal a relation of scale between furniture, architectural motifs and detail that in the majority of cases is nearly perfect. There has been no temptation because of the height of these rooms to increase the scale of cornices, mantels or other features. The rules of proportion determine the general mass of these features with respect to the wall spaces, but irrespective of the size of the apartment there is a uniform scale relation between the furniture and the architecture.

The French interior of the eighteenth century was a marvel of harmony between architecture, decoration and furniture and even the

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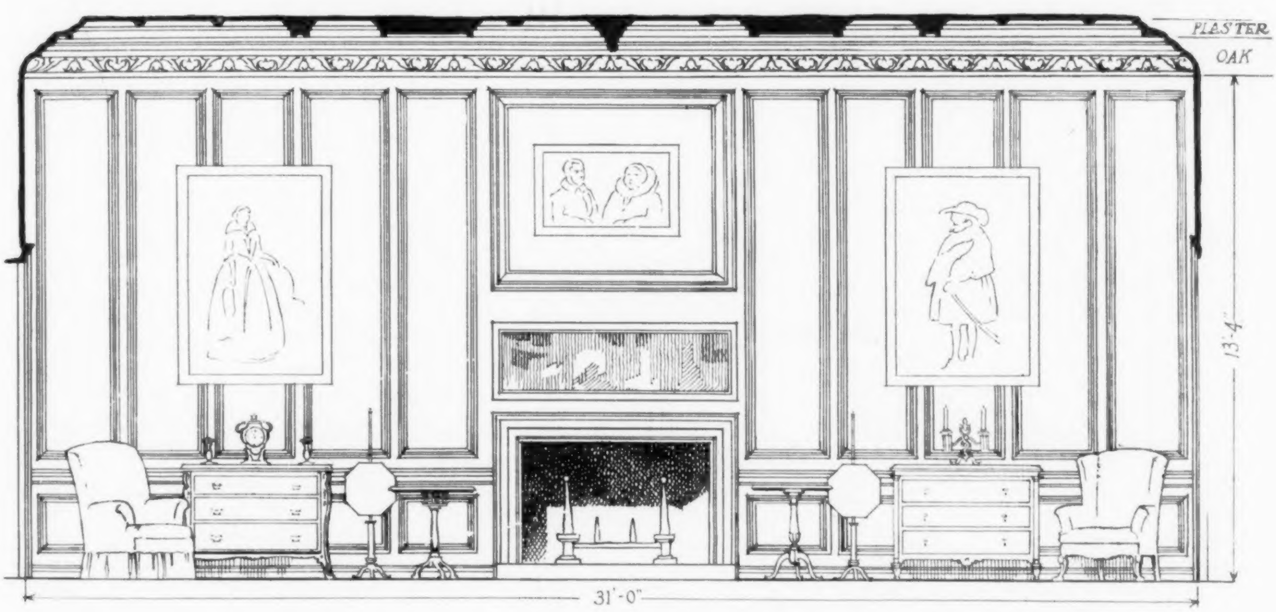
EARLY 18TH CENTURY ROOM WITH GOOD SCALE IN FURNISHINGS AND ARCHITECTURE



ELEVATION OF FIREPLACE SIDE OF ROOM SHOWING SCALE RELATION OF FURNITURE

The dimensions of the room are 31 ft. by 19 ft. 4 ins. and the height of the oak paneling 13 ft. 4 ins. The scale of the ceiling ornamentation is somewhat too large, but in other respects the room is excellently scaled. The relations between panels, doors, paintings, chandelier and most of the furniture are noteworthy. Although of generous proportions the scale of the woodwork is comparatively small; the panel stiles are 3¼ ins. wide, the wainscot cap is 3½ ins. deep and all moulded parts are made up of a series of fine members.

THE OAK PARLOR, BALLS PARK, HERTFORD, ENGLAND

Dining Room, Chateau du Breau, from painting by Walter Gay *Courtesy of E. P. Dutton & Co.*
An excellent example of the charm and perfection of scale in the 18th century French interior

dress of its occupants. The artists of this period relied upon an ensemble of which we can but imagine an imperfect view. The use of color in damask wall coverings, panel mouldings and decorative over-door paintings was echoed in the costumes, the whole reflected again and again by the tall, delicately framed mirrors characteristic of the time. The charm of these eighteenth century French rooms is perhaps nowhere better illustrated than in the paintings by Walter Gay, an American artist resident in Paris. The very human and temperamental qualities of these rooms possess such an appeal that a painting with no human beings in the picture conveys a complete sense of their livable qualities. These pictures, incidentally, indicate to architects suggestions for conveying to their clients through color studies the real spirit of the room rather than the cold delineation of the architecture.

The results produced in the eighteenth century were probably due to the fact that the schools of architectural design and furniture design were developed at the same time and by artists, in many cases identical, but in all cases working on the basis of common tradition and understanding. We are not so fortunate today as to be developing styles; information concerning the past is readily available to everyone, and since we have such a wide field from which to select according to individual inclination, it is perhaps only natural that errors in the assembling of things derived from so many sources should be made.

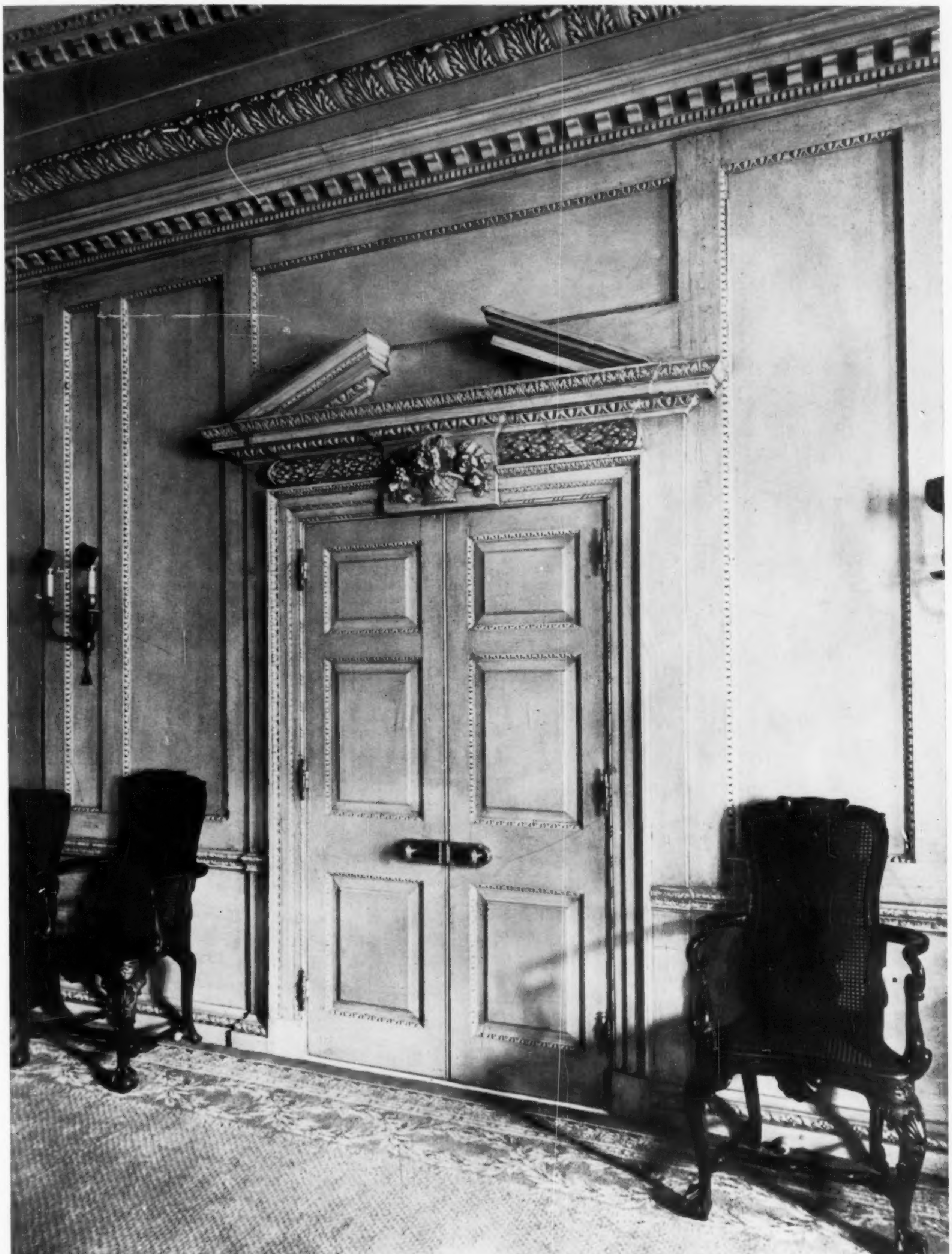
As a general statement it can truthfully be said that the modern interior is over-scaled. Motifs are frequently too large in their mass, and when not wrong in that respect, their mouldings and ornament are too heavy. There is little thought given to the sizes of panel rails, mouldings and the treatment of panels themselves. Door openings are often made too wide, and then pilasters and pediments are added to further injure scale. These may in themselves have good proportion and they may show pleasing relations of mass with the walls against which they are placed, but as soon as the average furnishings are introduced there is immediately apparent a wide gulf between architecture and movable objects.

To be successful in scale, any composition must be built up with some unit of measurement as a guide. The human figure provides this, but in the case of interiors it is well to consider also relation to articles of furniture. These may be used to establish the module of the room. If furniture of

DRAWING ROOM, HOUSE OF EGERTON L. WINTHROP, JR., ESQ., BROOKVILLE, LONG ISLAND

DELANO & ALDRICH, ARCHITECTS

A room of eighteenth century precedent influenced by the French in which there is excellent scale relation between architecture and furniture. Woodwork is ivory and general color scheme light in tone. Overdoor paintings by Albert Sterner



DOORWAY, DINING ROOM, HOUSE OF C. M. MacNEILL, ESQ., NEW YORK

FREDERICK J. STERNER, ARCHITECT

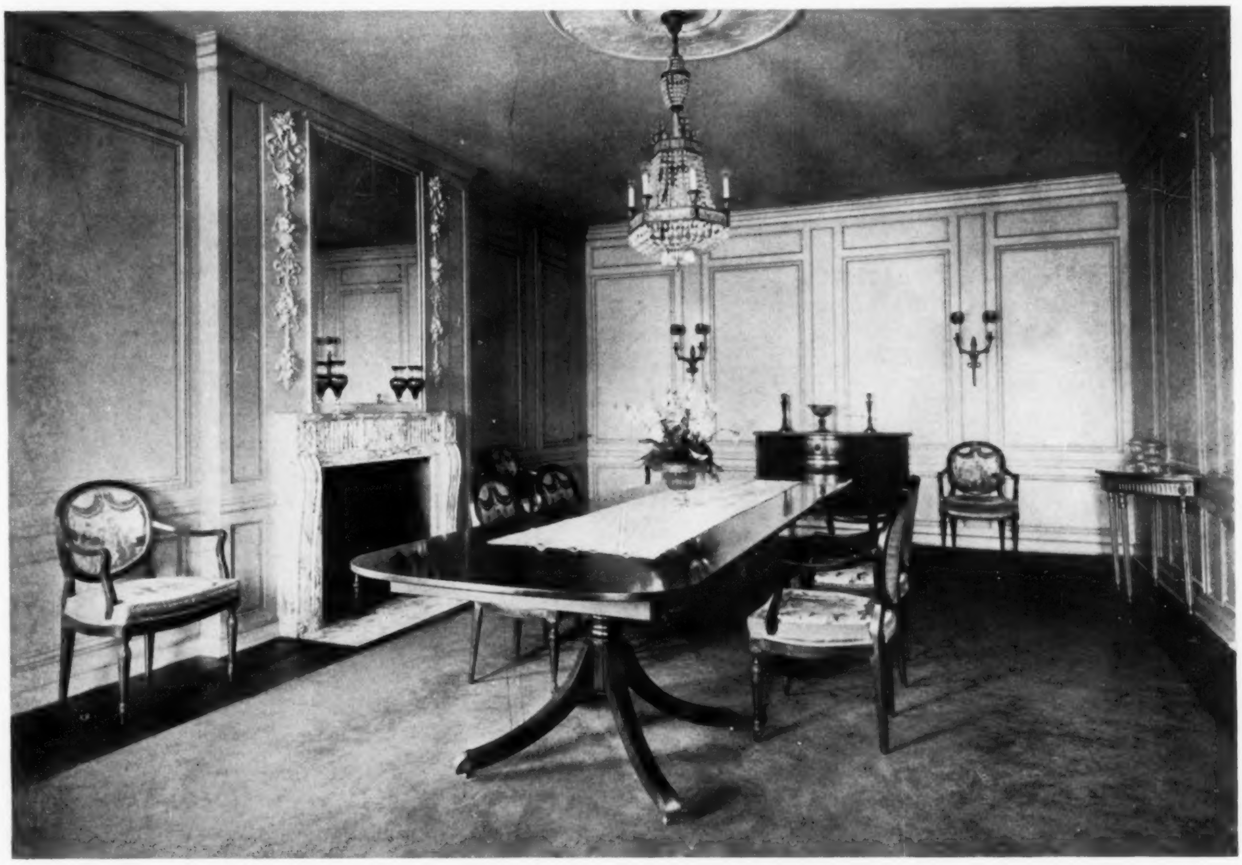
An interior doorway in Georgian style, with excellent scale relation to furniture and room. Finish is natural pine; height of door opening, 6 feet 10½ inches

the Adam character is to be used, we must provide a background correspondingly small in scale; the room can be comparatively small in floor area because no large pieces of furniture are to be accommodated. We can adopt any ceiling height in good proportion to the floor area and secure desirable vertical emphasis by means of pilasters, tall windows, narrow panels and other devices. A high ceiling should, however, not tempt us to increase the scale of ornamentation in the upper part of the room; the scale must be consistent throughout.

A study of old work in which the original furnishings still exist will show a marvelous harmony of line and scale between panel mouldings and other architectural details and the mouldings and turnings of the furniture. In English work of the latter part of the seventeenth century we find that the carving and turning and cane work of the Stuart chairs and the moulded and paneled chests accorded well with the small geometrical wall panels of the period; later the broad, heavy, Dutch lines of William and Mary furniture are in harmony with the vigorous, fat architectural mouldings and generous panels of the times. Similarly, in eighteenth century French work uniformity of character appears in both architecture and furniture. The chair backs of Louis XV furniture for instance reached to the height of the lower panel moulding and frequently had a curving pattern that complemented that of the panel. The perfect relation of scale gave to the smallest French apartment a sense of spaciousness that is all too often absent in modern work.

Color has an important bearing on scale because it has the property of altering the apparent size of an object. In the use of contrasting colors that strongly outline form, additional difficulties arise. A paneled room in which the walls are painted may have the panel mouldings colored differently from the rails and the fields. A moulding or panel size that appears in scale when in monotone may be made the reverse by causing it to stand alone through contrasting color. Similarly, an article of furniture apparently in good scale when it is closely related in color to its background takes on undue importance if it is strongly contrasting in color. Thus a room paneled in dark oak and designed to accord with definite furniture could not be painted in light tones and harmonize in scale with the same furniture.

In an interior we may combine furniture of English, French and Italian periods and the architectural background may be reminiscent of one period or a modern version with no distinct period traces. The success of such a room will depend to a large extent upon form and detail, but the great-



A Modern Dining Room Showing Influence of 18th Century French and English Styles with Furniture of Differing Periods Carefully Chosen for Scale and Beauty of Line

Howard Major, Architect

Simple Motifs and Small Scale Afford Satisfactory Background in Small Room

Over-scaled Mantel in Small Living Room Emphasized by Dark Color

est factor will be scale relation. Nor are we done when we have carefully correlated furniture and architecture; elements disturbing to good scale may enter in hangings, floor coverings or upholstery. Large patterned fabrics are by no means to be eliminated; they must, however, be placed where they belong. A group of windows may be framed at the sides, and have a valance above showing a bold pattern, but sufficient plain surface should be near to give a setting. Color, and particularly contrasting color, will be important in selecting a fabric that is to be in scale. Furniture upholstery, on the other hand, is rarely successful in large pattern — there is a wrong relation in the size of the ornament and the article ornamented. Large figured fabrics should be used sparingly — perhaps only on one generously proportioned piece of furniture to provide an accent. Carpets and rugs in the average room will take their places in the room ensemble if contrasting colors and bold patterns are avoided.

Scale must be studied from three angles,— mass, detail and color. Perfection in any one relation is not sufficient; all three must receive equal consideration.

Whether in our present interiors we adhere strictly to period distinction or not, appreciation of the essentially interior qualities of scale, proportion, color and balance between decorated and plain surfaces can be achieved only through diligent comparison of the elements that make up the fine rooms of the past, and the lessons thus learned can be applied with benefit to any original work. While scale is a subtle quality and defies description, it can in a measure be tested in the preparation of drawings. If we adopt the human figure as the unit of measurement, to which our architecture is scaled, the figure of a man when drawn against an elevation should be of normal height, measured at the scale at which the drawing is made if the design is in scale. If the figure scales 8 or 10 feet, the design is over-scaled and should be restudied; if but a few feet high the fault is too small a scale and an entirely new start should be made.

It is evident that interiors, depending as they do for perfection upon such subtle qualities as scale and proportion, cannot be satisfactorily achieved with methods in use today. There must be either a distinctly co-operative spirit in the efforts of architect and decorator, or the architect must expand his activities generally to include furnishing and decoration. It was the latter method that produced the work of the eighteenth century.

Room in Early Georgian House in Ireland
An example of bad interior scale; note extreme heaviness of architectural finish and doorway, both out of scale and out of proportion